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By CLARENCE R. SHOEMAKER

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SEVEN NEW AMPHIPODS FROM THE WEST COAST OF NORTH AMERICA WITH NOTES ON SOME UNUSUAL SPECIES

By Clarence R. Shoemaker[1]

While studying the unidentified amphipods from the west coast of North America in the collections of the Smithsonian Institution, I have noted undescribed species from time to time. Seven of these species are here described and illustrated; also redescriptions and supplementary figures are given of seven other species.

Family Lysianassidae

Kyska, new genus

Antennae 1 and 2 rather short, stout. Eyes large, pyriform. Mandible, incisor smooth with small tooth at inner end; molar conical, without triturating surface; palp 3-jointed. Maxilla 1, inner plate small, with 2 terminal setae; outer plate with 9 terminal spine-teeth,

[1] Died December 28, 1958. This paper, nearly completed, was prepared for publication by Thomas E. Bowman, U.S. National Museum. J. Laurens Barnard of the Beaudette Foundation read the manuscript critically and added several recent references.

2 lateral teeth; palp 2-jointed. Maxilla 2, inner plate shorter than outer. Maxilliped, inner plate with 3 terminal teeth; outer plate without marginal teeth; palp 4-jointed. Gnathopod 1 chelate. Gnathopod 2 slender, normal. Pereopods 3–5 increasing consecutively in length; basipod well expanded. Pleon segment 3 with lower hind corner sharply upturned. Branchiae plaited on both sides. Telson cleft beyond middle.

Type-species.—*Kyska dalli*, new species.

This new genus is very much like *Anonyx*, and the type-species bears a close superficial resemblance to *Anonyx nugax*. The characters that differentiate *Kyska* from *Anonyx* are the comparative shortness of the antennae, the lack of calceoli in the male, and the possession of chelate gnathopod 1 in both sexes; otherwise, the characters of *Kyska* are the same as those given by Stebbing (1906) for *Anonyx*.

Kyska dalli, new species

Figure 1

Male.—Eye black, pyriform. Antenna 1 about as long as head and pereon segment 1 combined, about ⅔ as long as antenna 2; first joint large, second and third joints very short; flagellum about as long as peduncle, composed of 17 joints; accessory flagellum ½ as long as primary and composed of 9–10 joints. Antenna 2, fourth joint slightly longer than fifth, flagellum longer than peduncle and composed of about 28–30 joints. Epistome not projecting beyond upper lip. Other mouthparts as shown in figures.

Coxal plate 1 expanded below, projecting slightly forward. Gnathopod 1, second joint about as long as remaining joints combined; fifth joint short, cup-shaped; sixth joint greatly developed, lower distal end produced forward, forming chela with short, curved, opposing seventh joint (figs. 1*a*,*h*). Gnathopod 2 normal.

Pereopods 1 and 2 similar, subequal in length. Pereopods 3–5 rather long, slender, increasing in length consecutively; second joints considerably expanded; fourth joint well expanded in pereopod 3, less expanded in pereopods 4 and 5. Seventh joint in all pereopods long, slightly curved.

Pleon segment 1, lower hind corner not produced; segment 2 rather sharply produced; segment 3 sharply upturned. Urosome segment 1 with slight dorsal depression. Uropod 1 reaching back farther than uropod 2, about as far as uropod 3. Uropod 3, outer ramus longer than inner and with small second joint. All uropods bearing only few short spinules. Telson cleft nearly to base, reaching back slightly beyond peduncle of uropod 3.

Gills plaited on both sides. Gill of pereopods 1 and 2 with appendage, that of pereopods 3 and 4 with pointed finger-like appendage.

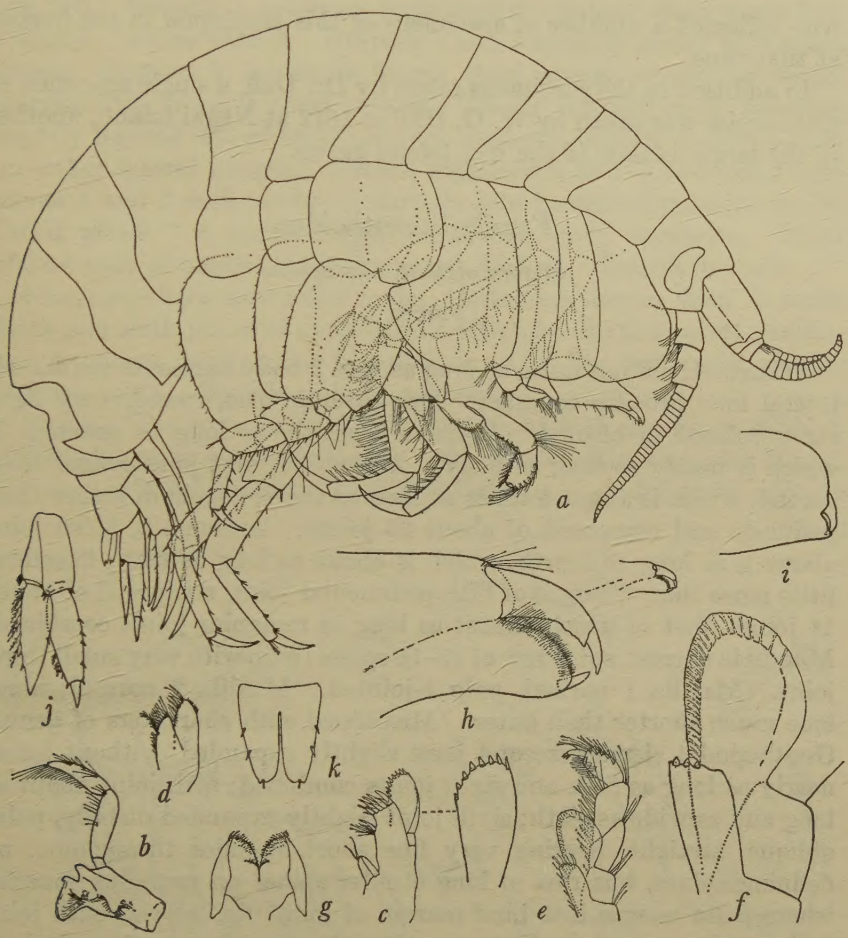

FIGURE 1.—*Kiska dalli*, new genus and species, male: *a*, entire animal; *b*, right mandible; *c*, maxilla 1; *d*, maxilla 2; *e*, maxilliped; *f*, inner and outer plates of right maxilliped; *g*, lower lip; *h*, end of gnathopod 1; *i*, end of gnathopod 2; *j*, uropod 3; *k*, telson.

Gill of pereopod 5 without finger-like appendage, but with short, stumplike appendage. Largest specimens in collection measure 22.5 mm. from front of head to end of uropods.

FEMALE.—Similar to male, but antennae shorter and fewer joints in flagella. Gnathopod 1 chelate, like that of male. Female as large as male.

TYPES.—Holotype male, USNM 95585, and 103 paratypes, USNM 13249, Kyska Island, Alaska, 6–8 fathoms in 1873, by Dr. William H. Dall.

The name "Kyska" was given to one of the principal islands of the Rat Island group, Western Aleutian Islands, in 1873, by Dr. Dall,

who collected a number of specimens of this amphipod in the harbor at that time.

In addition to the specimens taken by Dr. Dall, a single specimen of this species was taken by W. G. Hall in 1872 at Nagai Island, another of the larger islands of the Rat Island group.

Family Stenothoidae

Metopa stelleri, new species

FIGURE 2

MALE.—Head not quite as long as first 2 body segments combined; lateral lobe broadly rounded. Eye medium size, round, very light straw-colored in alcohol. Antenna 1 nearly as long as antenna 2, which is nearly as long as body. Antenna 1, first joint longer than second, which is about 5 times as long as third; flagellum longer than peduncle and composed of about 25 joints. Antenna 2, third joint about ⅓ as long as fourth, which is about as long as fifth; flagellum little more than ½ length of fifth peduncular joint, composed of about 11 joints, first of which almost as long as remaning joints combined. Mandible normal, spine row of 15–16 spines; palp with very small third joint. Maxilla 1 normal, palp 1-jointed. Maxilla 2 normal; inner lobe much shorter than outer. Maxilliped with characters of genus. Gnathopod 1 slender, second joint slightly expanded, without lobes, nearly as long as fifth and sixth joints combined; fifth joint about as long and as wide as sixth; sixth joint slightly expanded distally, palm oblique, straight, bearing very fine short spinules throughout, no defining spines, but row of long slender spines on rounding margin, where palm merges into hind margin of joint (fig. 2*d*); seventh joint fitting palm, armed on inner margin with very fine teeth and short spinules. Gnathopod 2 large, strong; second joint not as long as sixth, with rounding lobe on lower front margin; fifth joint less than ½ as long as sixth, with lobe between fourth and sixth joints; sixth joint large, strong, front and hind margins convex, palm very oblique, convex, armed with irregular low teeth and defined by tooth bearing slender spine on its inner margin; seventh joint stout, slightly shorter than palm and bearing minute setules on inner margin.

Pereopod 1 long, slender. Pereopod 2 not as long as pereopod 1, but stouter. Pereopod 3 longer than pereopods 4 or 5, which are subequal in length; second joint slender, without lower lobe. Pereopods 4 and 5 strong; second joint broadly expanded; fourth joint large, broadly expanded with hind margin produced slightly beyond end of fifth joint. Seventh joints of pereopods 1–5 rather short, stout, with inner margins bearing very low forward-pointing teeth

(fig. 2*f*). Uropod 1 reaching back slightly farther than uropod 2, 2 slightly farther than 3. Uropods 1 and 2 scantily armed with short spines. Uropod 3, peduncle longer than ramus, armed on upper margin with 8 or 9 short spines. Telson broadly oval, reaching slightly beyond end of third urosome segment, bearing 5 short spines on either lateral margin. Pereon segments 6 and 7 and pleon segments 1 and 2 each produced dorsally into backward-pointing tooth. Coxal plates 2–4 much deeper than their body segments. Coxal plate 4 only of moderate size for genus *Metopa*. Length to 9 mm.

Female.—Very much like male. Antennae shorter than in male. Fifth and sixth joints of gnathopod 1 shorter. Sixth joint of gnathopod 2 not so large; palm less oblique, with fine teeth and shorter defining tooth. Female as large as male.

Types.—Holotype male, USNM 96489, and 11 paratypes, USNM 107860, taken at Albatross station 4803, Cape Rollin, Simushir Island, Kuriles (46°42′ N, 151°45′ E) in 229 fathoms, June 24, 1906. Single

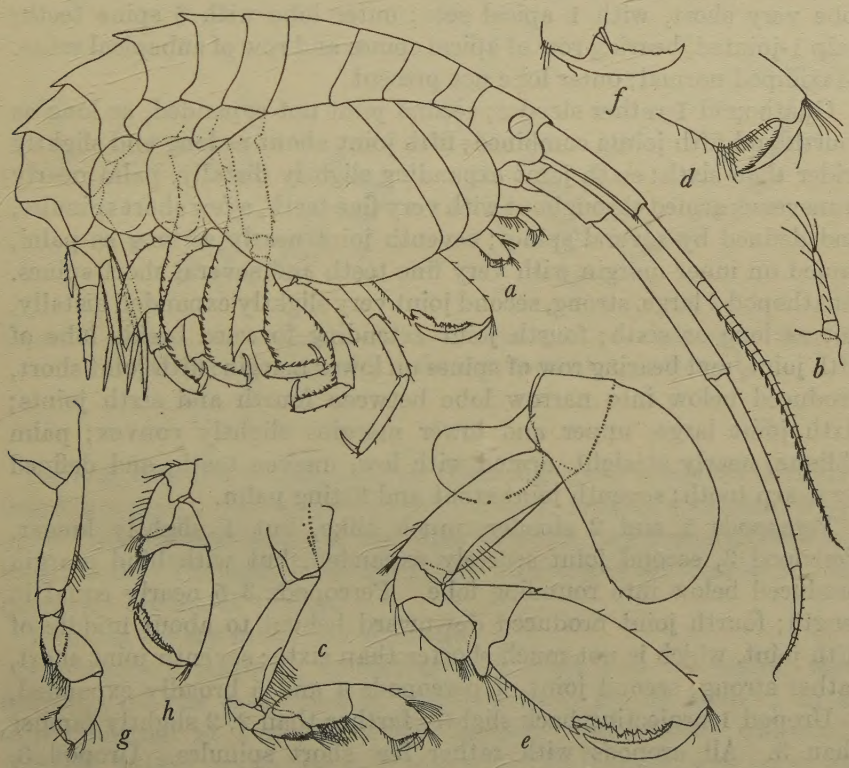

Figure 2.—*Metopa stelleri*, new species, male: *a*, entire animal; *b*, mandibular palp; *c*, gnathopod 1; *d*, end of gnathopod 1; *e*, gnathopod 2; *f*, end of pereopod 2; female: *g*, gnathopod 1; *h*, gnathopod 2.

specimen taken on same date at nearby Albatross station 4804 (46°42′ N, 151°47′ E) also in 229 fathoms.

Metopa stelleri differs from *M. cristata* Gurjanova (1955), its closest relative, by the lack of dorsal teeth on the segments anterior to pereon 6.

Metopa cristata Gurjanova

FIGURE 3

Metopa cristata Gurjanova, 1955, pp. 176–178, figs. 7–8.

MALE.—Head not as long as first 2 body segments combined. Eye medium sized, nearly round, light straw-colored in alcohol. Antenna 1 slightly shorter than antenna 2; first joint longer than second, which is about 3 times as long as third; flagellum shorter than peduncle and composed of about 13 joints. Antenna 2, third joint nearly ½ length of fourth, which is nearly as long as fifth; flagellum about ⅔ length of fifth peduncular joint, composed of 8–9 joints. Mandible normal, second joint of palp long, third joint very small. Maxilla 1, inner lobe very short, with 1 apical seta; outer lobe with 6 spine teeth; palp 1-jointed, bearing row of apical spines and row of subapical setae. Maxilliped normal; outer lobe not present.

Gnathopod 1 rather slender; second joint not expanded, as long as fourth and fifth joints combined; fifth joint about as long and slightly wider than sixth; sixth joint expanding slightly distally, palm nearly transverse, armed throughout with very fine teeth, a few short spinules, and defined by several spines; seventh joint nearly as long as palm, armed on inner margin with very fine teeth and several short spines. Gnathopod 2 large, strong, second joint very slightly expanded distally, not as long as sixth; fourth joint extending forward beside lobe of fifth joint, and bearing row of spines on lower margin; fifth joint short, produced below into narrow lobe between fourth and sixth joints; sixth joint large, upper and lower margins slightly convex; palm oblique, nearly straight, armed with low, uneven teeth, and defined by sharp tooth; seventh joint stout and fitting palm.

Pereopods 1 and 2 slender, much alike, but 1 slightly longer. Pereopod 3, second joint scarcely expanded, but with hind margin produced below into rounding lobe. Pereopods 3–5 nearly equal in length; fourth joint produced downward behind to about middle of fifth joint, which is not much shorter than sixth; seventh joint short, rather strong; second joint of pereopods 4 and 5 broadly expanded.

Uropod 1 projecting back slightly farther than 2, 2 slightly farther than 3. All uropods with rather few short spinules. Uropod 3, peduncle slightly longer than ramus and bearing row of very short spinules on upper margin; first joint of ramus with 3 marginal spinules. Telson broadly oval, with 4 minute spinules on either lateral margin.

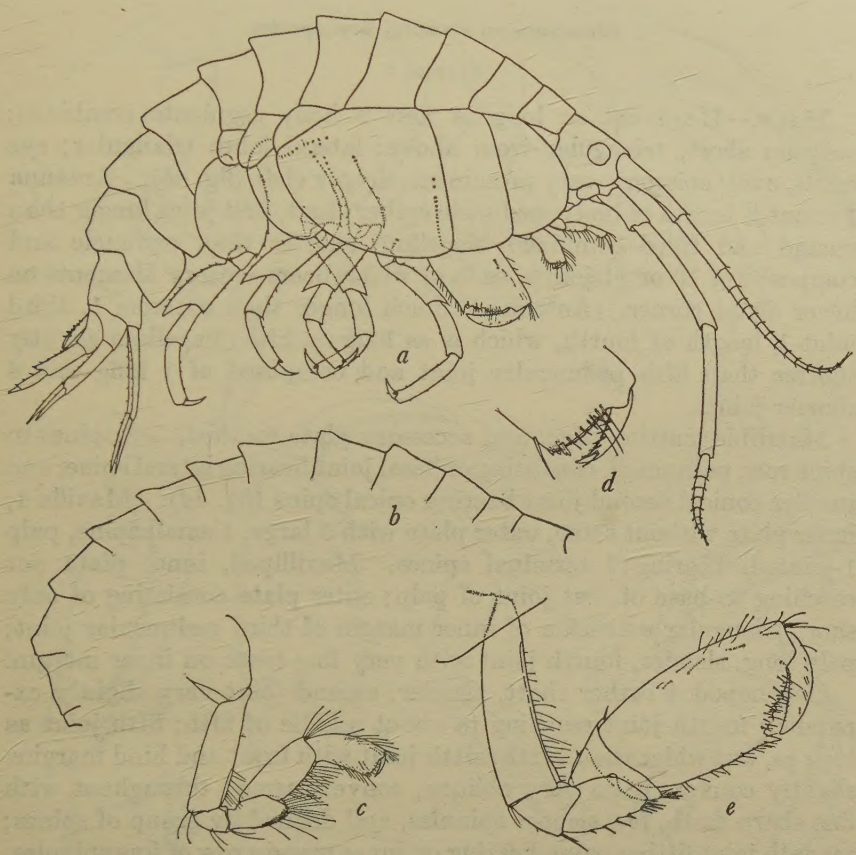

FIGURE 3.—*Metopa cristata* Gurjanova, male: *a*, entire animal; *b*, dorsal part of body of another male; *c*, gnathopod 1; *d*, end of gnathopod 1; *e*, gnathopod 2.

Several pereon segments and all pleon segments produced dorsally into low carinae. These carinae are variable; in some specimens they appear more or less truncate, while in others some are produced slightly backwards. The male measures about 7 mm., and the females in the collection are about 10 mm.

FEMALE.—Very much like the male.

Gurjanova's material, consisting of a male and 2 females, was collected on the east coast of Iturup Island, Kurile Islands, on a sandy bottom at a depth of 207 meters. The present collection (USNM 96488), consisting of 6 males and 22 females, was taken at Albatross station 5037, east of northern Honshu Island, Japan (42°02′40″ N, 142°33′20″ E), at 349 fathoms.

***Mesometopa sinuata*, new species**

FIGURE 4

MALE.—Head not as long as first 2 body segments combined; rostrum short, triangular from above; lateral lobes triangular; eye small, oval; epistome very prominent, deeply cleft (fig. 4*b*). Antenna 1 about ⅓ length of body, peduncle rather stout, first joint longer than second and third combined, flagellum shorter than peduncle and composed of 10 or 11 joints, each of which bears sensory filaments on lower distal corner. Antenna 2 much longer than antenna 1, third joint ½ length of fourth, which is as long as fifth; flagellum slightly shorter than fifth peduncular joint and composed of 1 long and 4 shorter joints.

Mandible, cutting-edge, and accessory plate toothed, 7–8 spines in spine row, palp small, consisting of basal joint bearing lateral spine, and smaller conical second joint bearing apical spine (fig. 4*d*). Maxilla 1, inner plate without setae, outer plate with 5 large, 1 small spine, palp 1-jointed, bearing 7 terminal spines. Maxilliped, inner plate not reaching to base of first joint of palp; outer plate consisting of only short triangular extension of inner margin of third peduncular joint; palp long, slender, fourth joint with very fine teeth on inner margin.

Gnathopod 1 rather short, slender; second joint very slightly expanded; fourth joint reaching to about middle of fifth; fifth joint as long as, but wider than, sixth; sixth joint with front and hind margins slightly convex, palm very oblique, convex, armed throughout with fine sharp teeth, few slender spinules, and defined by group of spines; seventh joint fitting palm, bearing on inner margin row of fine spinules, and small forward-pointing tooth near apex (fig. 4*g*). Gnathopod 2 with outside front margin of second joint expanded into thin transparent lobe on outer and inner front margin; fourth joint with triangular lobe on inside surface projecting above upper margin of fifth joint, lower margin of joint produced forward on outside of lobe of fifth joint; fifth joint normal; sixth joint large, longer than wide, palm very oblique with deep oblong sinus between defining tooth and distal portion of palm, which is provided with several blunt teeth and few setules (fig. 4*h*); seventh joint stout, curved, shorter than palm and bearing closely set setae on inner margin and a few setae on outer margin.

Pereopods 1 and 2 about equal in length, but 2 stouter; fourth joint with front margin produced slightly downward. Pereopod 1 almost entirely devoid of spines. Pereopods 3–5 consecutively shorter. Pereopod 4, second joint linear; fourth joint expanded with lower hind corner reaching to about middle of fifth joint; fifth joint shorter than sixth; seventh joint over ½ length of sixth. Pereopod 5, second

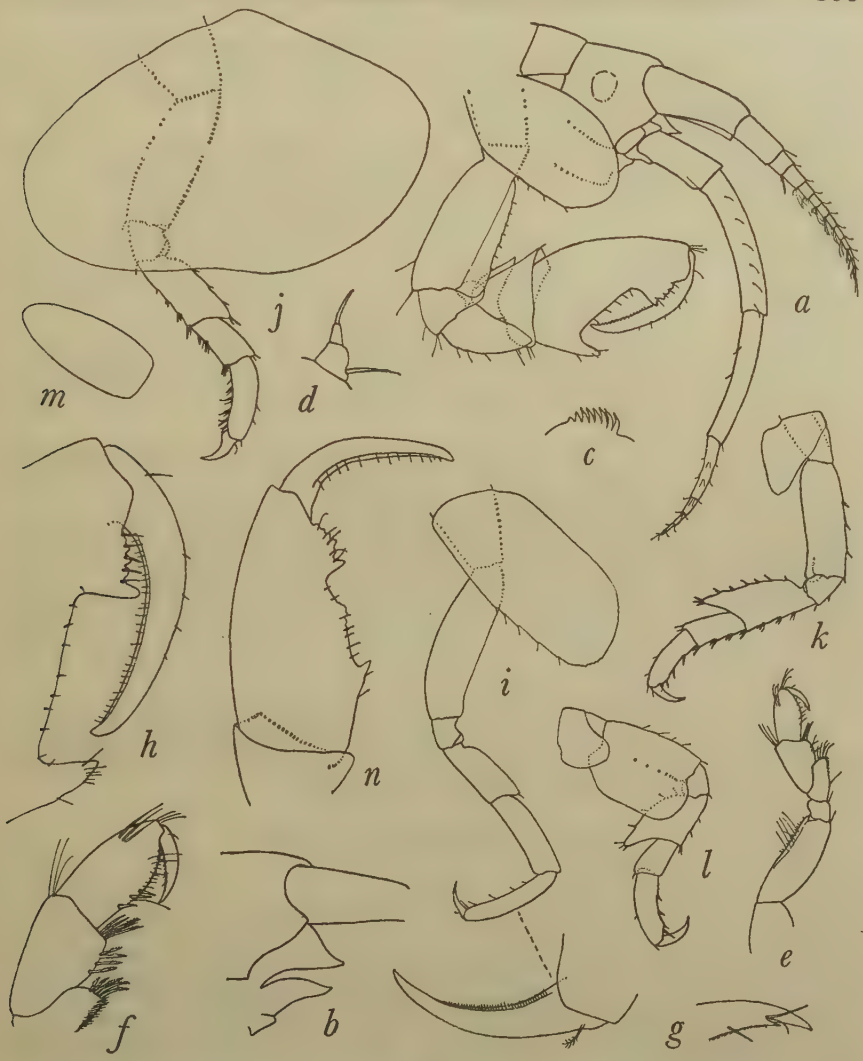

FIGURE 4.—*Mesometopa sinuata*, new species, male: *a*, anterior end of animal; *b*, epistome; *c*, spine row of mandible; *d*, palp of mandible; *e*, gnathopod 1; *f*, end of gnathopod 1; *g*, end of seventh joint of gnathopod 1; *h*, palm and seventh joint of gnathopod 2; *i*, pereopod 1; *j*, pereopod 2; *k*, pereopod 4; *l*, pereopod 5; female: *m*, telson; *n*, end of gnathopod 2.

joint expanded; fourth joint more expanded than that of pereopod 4, with hind margin reaching down beyond middle of fifth; fifth joint much shorter than sixth; seventh joint over ½ length of sixth. Seventh joint of all pereopods with very fine closely set teeth on inner margin (fig. 4*i*). Coxal plates 2–4 much deeper than their body segments, increasing consecutively in depth. Coxal plate 2 reaching forward to front margin of head, evenly rounding below, having several spinules

on hind margin. Coxal plate 3 with sides parallel, unevenly rounding below, having several spinules on hind margin. Coxal plate 4 large, with sinuous lower margin (fig. 4*j*).

Pleon segments 2 and 3 with lower hind corner forming less than right angle. Uropod 1 extending back slightly farther than 2, 2 slightly farther than 3. Peduncles of uropods 1 and 2 edged with fine spines, but rami have few, if any, spines. Peduncle of uropod 3 with 3–4 spines on upper margin and 1 spine at distal end of first joint of ramus. Telson reaching to about middle of peduncle of uropod 3 and bearing no spines. Length of male about 4 mm.

Female.—Much like male, even in size. In gnathopod 2 defining tooth of palm not so large; sinus of palm less deep with slight protuberance near middle.

Holotype.—A male, USNM 94503, collected by E. F. Ricketts from boat bottom, Monterey Bay, California, June 9, 1930.

Remarks.—In the U.S. National Museum there are 6 specimens from Monterey Bay and 2 specimens from Moss Beach, San Mateo Co., California; 1 specimen from Squaw Island, near Coos Bay, Oregon, and 1 specimen from South Bay, coast of Coos Bay. The male and female figured are from Moss Beach and were collected by W. H. Marshall, June 1, 1939.

This species differs from *Metopa esmarki* Boeck (1872) from San Francisco, California—transferred to *Mesometopa* by Gurjanova (1951)—by the short fifth joint of gnathopod 1.

Metopelloides dubia, new species

Figure 5

Male.—Head shorter than first 2 body segments combined; lateral lobes rather prominent, evenly rounded; eye not visible. Antenna 1 reaching end of fourth joint of antenna 2; flagellum shorter than peduncle and composed of about 16 joints. Antenna 2 more than ½ length of body; third joint ½ length of fourth, which is longer than fifth; flagellum about as long as fifth peduncular joint and composed of about 16 joints, first of which is long, appearing to be made up of 3–4 fused joints.

Right mandible with rather broad toothed cutting-edge; accessory plate consisting of 4 knoblike spines, upper one of which broadest, lowest one narrowest (fig. 5*d*); spine row with about 18 rather blunt curved spines; molar absent; palp 1-jointed, bearing 4 terminal and 3 lateral spines (fig. 5*c*). Maxilla 1, inner plate lost in dissecting; outer plate with 6 large teeth, 1 small tooth; palp 1-jointed, oblique distal end armed with 13 terminal teeth and row of submarginal setae. Maxilla 2, inner plate shorter, narrower than outer, both very oblique distally, edged with usual spines. Maxilliped, inner plate very small; outer plate very small extension of inner margin of third joint, inner margin

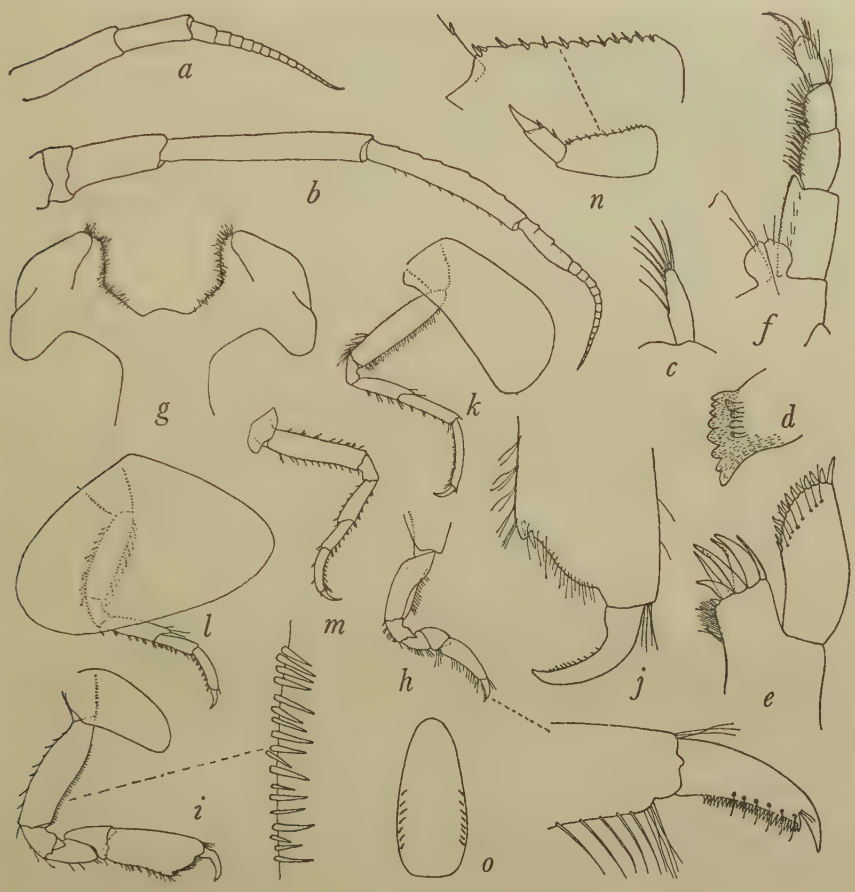

FIGURE 5.—*Metopelloides dubia*, new species, male: *a*, antenna 1; *b*, antenna 2; *c*, mandibular palp; *d*, cutting-edge and accessory plate of right mandible; *e*, maxilla 1; *f*, maxilliped; *g*, lower lip; *h*, gnathopod 1; *i*, gnathopod 2; *j*, end of gnathopod 2; *k*, pereopod 1; *l*, pereopod 2; *m*, pereopod 3; *n*, uropod 3; *o*, telson.

of joint bearing row of very fine spinules (fig. 5*f*); palp rather short, first joint slightly longer than subequal second and third; fourth joint slender, curved, bearing nail and row of fine spinules on inner margin. Lower lip with widely separated lobes; mandibular processes very short, blunt.

Coxal plates 2–4 much deeper than their body segments. Coxal plate 2 extending forward to front of head. Gnathopod 1, second joint about as long as fifth and sixth joints combined; third, fourth, and fifth joints equal in length, third with small downward-pointing lobe; sixth joint narrowing distally, without palm; seventh joint nearly ½ length of sixth, inner margin armed with fine closely set teeth and

about 6 setae, and with rather deep angular sinus near apex (fig. 5*h*). Gnathopod 2, second joint not as long as fifth and sixth combined; third, fourth, and fifth joints about equal in length, third bearing small downward-projecting angular lobe; sixth joint twice length of fifth, about twice as long as wide, expanding slightly distally; palm oblique, convex, finely crenulate throughout, defined by rather blunt tooth and 2 spines (fig. 5*j*); seventh joint stout, curved, fitting palm.

Pereopods 1 and 2 slender, pereopod 1 slightly longer (fig. 5*k*). Pereopods 3–5 alike, 4 slightly the longest; second joint linear. Uropod 1 reaching posteriorly farther than 2, 2 farther than 3. Peduncles of all uropods with many fine, closely set spines. Uropod 1, outer ramus with 5 marginal spines; inner ramus with 3 marginal spines. Uropod 2, outer ramus with 4 marginal spines; inner ramus with 3. Uropod 3, peduncle armed with row of short spines on upper outer margin; first joint of ramus with 1 median, 1 distal spine. No terminal spines on any rami. Telson long, narrow, reaching back about ⅔ length of peduncle of uropod 3, and bearing row of 7–8 spinules on either lateral margin. Length, from front of head to end of uropods, about 13 mm.

Holotype.—Male, USNM 95660, taken by U.S. Bureau of Fisheries at St. Paul Island, Pribilof Islands, Jan. 13, 1918, from stomach of duck, *Somateria voniger*.

Remarks.—Because the specimen is from the stomach of a duck, neither gills nor marsupial plates are present, but it is inferred from the great development of the second antenna that the specimen is a male. There is a close resemblance in some of the characters to *Metopelloides shoemakeri* Gurjanova (1938). Her specimen, apparently a female, measured only 4 mm., but the present specimen, presumably a male, measures 13 mm. Whether the difference between these two species is due to the immaturity of Gurjanova's specimen or to the difference in sex is impossible to determine. Further and more abundant material probably will decide the question, but for the present it seems best to regard them as distinct species.

Proboloides pacifica (Holmes)

Figure 6

Metopa pacifica Holmes, 1908, p. 524, figs. 30–31.
Metopella pacifica.—Gurjanova, 1951, p. 478, fig. 315.

Male.—Head nearly as long as first 2 body segments combined; lateral lobes bluntly triangular with apex rounding. Eye not present in alcoholic type. Antenna 1 almost as long as antenna 2, peduncle reaching slightly beyond fourth joint of antenna 2; first joint shorter than second; third joint about ¼ as long as second; flagellum shorter

than peduncle and composed of about 14 joints, each of which carries slender sensory filament. Antenna 2 nearly as long as body; third joint not quite ½ length of fourth, which is longer than fifth; flagellum about ½ length of fifth peduncular joint and composed of about 6 joints. Last 1 or 2 flagellar joints missing in both first and second antennae. Mandible with 3-jointed palp; second joint long, third very short; cutting-edge toothed; spine-row of 6 spines; molar not observed. Maxilla 1, inner lobe with 1 terminal seta; outer lobe with 5–6 spine-teeth; palp 2-jointed, bearing 7 spines on inner distal margin of second joint. Maxilla 2 not observed. Maxilliped very slender with rudimentary outer plate.

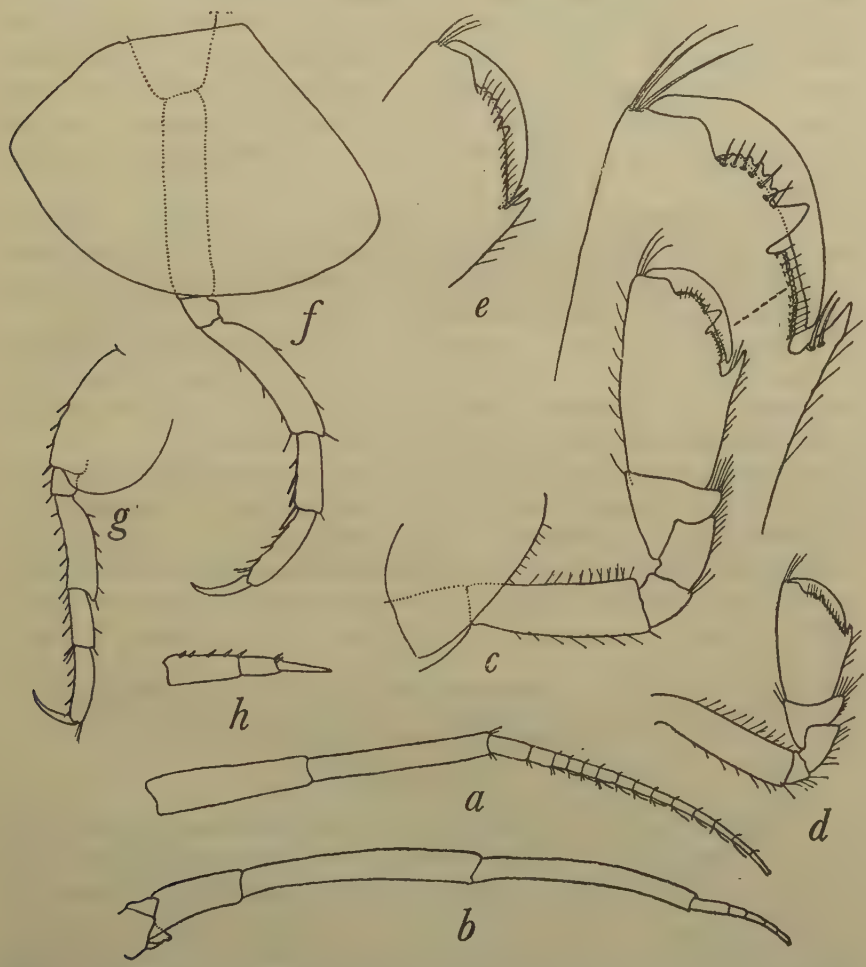

FIGURE 6.—*Proboloides pacifica* (Holmes), male: *a*, antenna 1; *b*, antenna 2; *c*, gnathopod 2; female: *d*, gnathopod 2; *e*, end of gnathopod 2; *f*, pereopod 2; *g*, pereopod 5; *h*, uropod 3.

Gnathopod 1 with fifth joint longer than sixth, which is distinctly subchelate. Sixth joint with palm oblique, convex, defined by spines, and about as long as hind margin of joint. Seventh joint fitting palm and armed on inner margin with minute spinules. Gnathopod 2 large (fig. 6*c*); palm very oblique, defined by stout sharp tooth, with large tooth in middle, on either side of which are small teeth; seventh joint strong, fitting palm. Pereopods 1 and 2 slender, 1 slightly slenderer than 2; fourth joint not produced downward in front; seventh joint rather long, slender, slightly curved. Pereopods 4 and 5 with second joint expanded; fourth joint very slightly expanded, only slightly produced downward; seventh joint about ⅔ length of sixth. Pleon segment 3 about as shown by Sars (1895, pl. 94, fig. 2) for *Metopa invalida*. Uropod 1 reaches back slightly farther than uropod 2, 2 slightly farther back than 3. Uropod 3, peduncle slightly shorter than ramus, first joint of which is shorter than second (fig. 6*h*). Telson narrowly oval with narrow rounding apex, and bearing 3 short spines on either lateral margin. Length 6 mm.

Female.—Gnathopod 2 not as large as in male; palm oblique, convex, defined by tooth and 2 spines (fig. 5*e*), and armed throughout with small rounding teeth, one of which near middle is slightly larger than rest; seventh joint fitting palm.

Remarks.—The above description is based on the 2 syntypes, a male and a female, USNM 38550, from Albatross station 4516, Monterey Bay, California, May 24, 1904, 718–756 fathoms, among hydroids on the back of a spider crab, *Hyas* species.

Holmes' species is here placed in the genus *Proboloides* Della Valle, as it differs from *Metopa* by having a 2-jointed palp to maxilla 1 and not a 1-jointed palp as in *Metopa*. It was assigned to *Metopella* Sars by Gurjanova (1951), perhaps on the basis of Holmes' statement (1908): "Last three peraeopods with the merus not widely expanded"—but, as shown herein, the merus is widely expanded on pereopods 4 and 5.

Family Tironidae

Syrrhoe longifrons, new species

Figure 7

This species differs from *S. crenulata* Goës (1866) as follows: Head elongate, about as long as first 5 body segments combined, produced slightly forward, evenly rounding. Rostrum pointing downward and backward toward body, not straight downward as in *S. crenulata*. Eyes reddish brown in alcohol, elongate, about ½ as long as head, united above and occupying almost entire front of head. Lateral angle of head truncate, not angular. Lower front corner of first 3

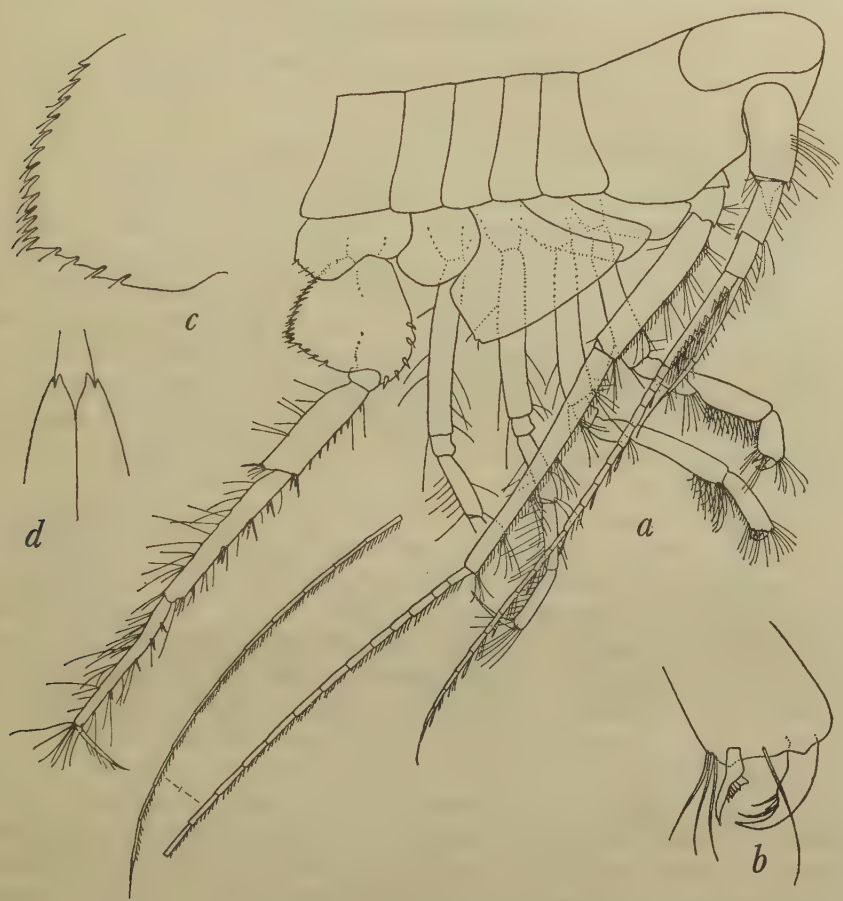

FIGURE 7.—*Syrrhoe longifrons*, new species, male: *a*, anterior end of animal; *b*, distal end of gnathopod 1; *c*, posterior margin of second joint of pereopod 3; *d*, distal end of telson.

coxal plates somewhat more produced. Second joint of pereopods 3–5 more angularly produced behind. The rest of the characters agree rather closely with those of *S. crenulata*. Length of male from front of head to end of uropods about 10 mm.

TYPES.—Male holotype, USNM 94235, and 2 paratypes, USNM 107862, taken at Mittelnacht, Vancouver Island, British Columbia, by G. H. Wailes. Specimens from other localities on Vancouver Island are also present in the collections of the U.S. National Museum.

REMARKS.—Although *Syrrhoe longifrons* resembles *S. crenulata*, the differences given above are found in all the specimens in the U.S. National Museum (all from Vancouver Island) and appear to be constant. The widespread *S. crenulata* is a more northern species and occurs in Alaskan waters.

Family Calliopiidae

Halirages bungei Gurjanova

FIGURE 8

Halirages bungei Gurjanova, 1951, pp. 611–612, fig. 414.

FEMALE.—Head as long as first 2 body segments combined; rostrum very short, broad; lateral lobe obliquely truncate; lower corner broadly rounding; eye long, consisting of narrow black central area bordered by colorless ocelli. Antennae subequal, but 1 perhaps slightly shorter. Antenna 1 about as long as head and first 5 body segments combined; peduncle short, joints decreasing consecutively in length; accessory flagellum rudimentary (fig. 8*b*); primary flagellum consisting of about 44 joints, every other one of which bears 2 sensory filaments on lower distal end. Antenna 2 with fifth joint longer than fourth; flagellum consisting of about 38 joints.

Mandible with cutting-edge narrow, toothed; accessory plate narrow with bifid apex; spine-row of 9 spines; molar strong with well-developed triturating surface and armed on upper edge with long slender teeth; palp strong with second joint longest. Upper lip symmetrically rounding. Maxilla 1, inner plate long, armed apically with 5 plumose setae; outer plate armed with 11 serrate spine-teeth; palp 2-jointed, rather broad, bluntly rounding apex armed with 14 serrate spine-teeth and on outside with 6 subapical setae. Maxilla 2, inner plate slightly longer, armed apically with spines, and on inner margin with spines, 4 of which are longer than rest; outer plate armed with apical spines. Lower lip without inner lobes; mandibular processes rather short, apically rounding. Maxilliped, second joint with several spines on outer margin; inner lobe rather long, reaching slightly beyond middle of outer lobe, armed distally with curved plumose spines or setae and 3 short spine-teeth, 2 innermost being separated from third by slight sinus; outer plate reaching middle of second joint of palp, bearing distally a closely set row of slender curved plumose spines, and bearing on inner margin transparent lamella, from base of which arises row of slightly curved serrate spine-teeth; palp rather short, stout, third joint bearing group of spines near middle of outer margin and spines and small rounding lobe distally; fourth joint rather slender, slightly curved, bearing distally sharp nail and few setules.

Gnathopods 1 and 2 alike in form and size, though 1 may possibly be slightly longer; second joint scarcely expanded distally; fifth joint not expanded, about ⅔ as long as sixth; sixth joint long, narrow, of equal width throughout, bearing groups of spines on hind margin; palm convex, very oblique, edged with narrow smooth transparent lamella and merging into hind margin without defining angle, but

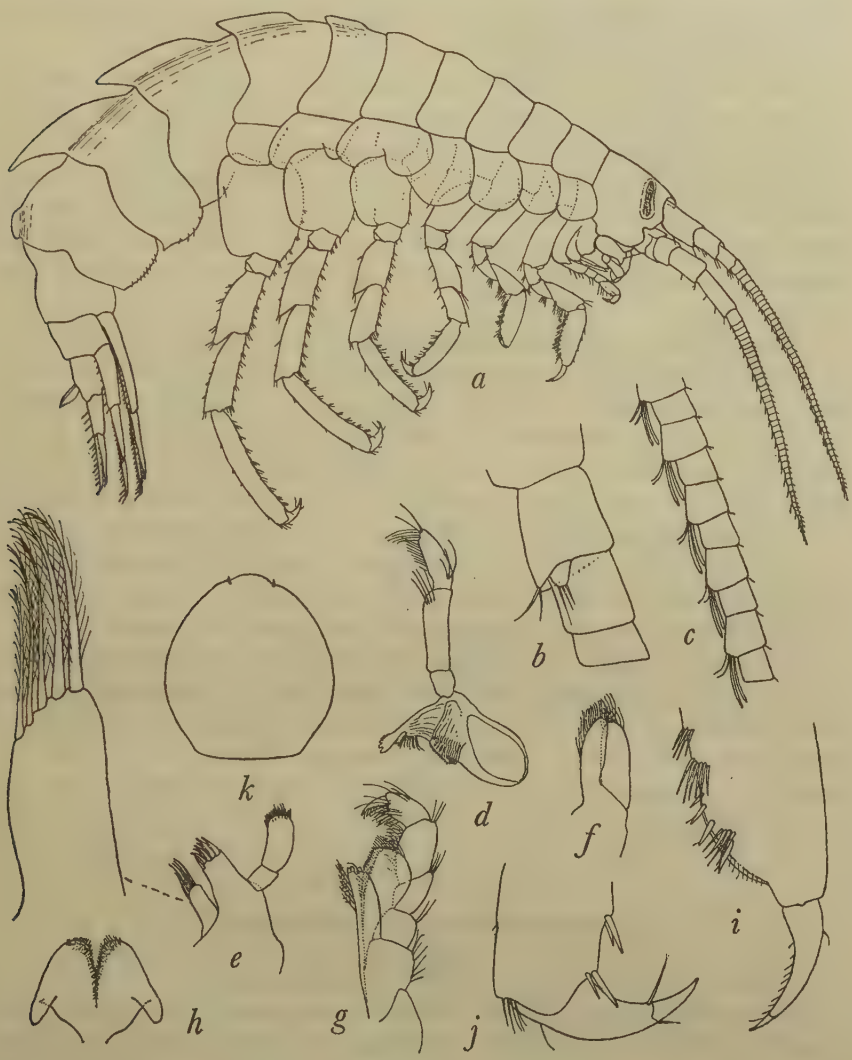

FIGURE 8.—*Halirages bungei* Gurjanova, female: *a*, entire animal; *b*, antenna 1, showing accessory flagellum; *c*, part of flagellum of antenna 1; *d*, mandible; *e*, maxilla 1; *f*, maxilla 2; *g*, maxilliped; *h*, lower lip; *i*, end of gnathopod 1; *j*, end of pereopod 4; *k*, telson.

defined on outside by row of 4 spines, distal one of which longest; seventh joint fitting palm and bearing row of spinules on inner margin.

Pereopods 1 and 2 alike in form and size, fourth joint very slightly expanded distally; sixth joint nearly as long as fourth and fifth combined; seventh joint short, stout, bearing rather long spinule on inner margin. Pereopods 3–5 alike in form, but increasing consecutively in length; second joint expanded but with almost no lower

posterior lobe. Coxal plates 1–4 shallow, increasing consecutively in size, fourth excavate behind.

Pereon segment 6 with small backward-pointing dorsal carina. Pereon segment 7 with larger dorsal carina. Pleon segments 1 and 2 each with strong backward-pointing dorsal carina; segment 3 with small dorsal carina which is scarcely backward pointing. Pleon segments 1 and 2 with lower posterior corner sharply produced, lower margin bearing few spinules; segment 3 with lower posterior corner blunt-angled or without angle and lower margin bearing row of spinules.

Uropods 1 and 2 reaching back about same distance. Uropod 1, peduncle longer than rami, outer ramus shorter; both peduncle and rami margined with many fine short spines. Uropod 2, peduncle slightly longer than outer ramus, but shorter than inner; both peduncle and rami margined with fine short spines. Uropod 3 not reaching back quite as far as 2; peduncle slightly shorter than rami and bearing 4 spines on upper margin which are longer than those on rami. Telson reaching to about middle of peduncle of uropod 3, broadly oval, slightly longer than wide, bearing 2 minute apical spinules. Female measures about 13 mm. from front of head to end of uropods.

Remarks.—Gurjanova's specimens, 22 in number, were taken on the east coast of Kamchatka, among algae and on fine sand, up to a depth of 60 m. The U.S. National Museum collections contain 12 specimens from Bering Island, Commander Islands, 9 of them collected by Leonard Stejneger in 1882–83, and 3 specimens collected by N. Grebnitzky on August 6, 1888.

Family Pleustidae

Sympleustes cornigera, new species

Figure 9

Male.—Head with short rostrum, appearing triangular from above; lateral lobe triangularly produced, with narrow rounding apex; lower corner narrowly, sharply produced; eye large, broadly reniform, rather colorless in alcohol. Antenna 1 much longer than antenna 2; first joint longer than second, which is about twice as long as third; flagellum consisting of about 90 joints, first of which is longest.

Mandible with rather broad cutting-edge, but without accessory plate; spine-row of about 14 spines (fig. 7*c*); molar conical with rather small triturating surface; palp about as shown for *Sympleustes latipes* by Sars (1895, pl. 127, fig. m) (=*Stenopleustes*, according to Barnard and Given, 1960). Maxilla 1, inner plate broad, without plumose setae, but fringed with fine setules; outer plate armed with 9 spine-teeth; palp armed with distal row of 7 spines and submarginal row

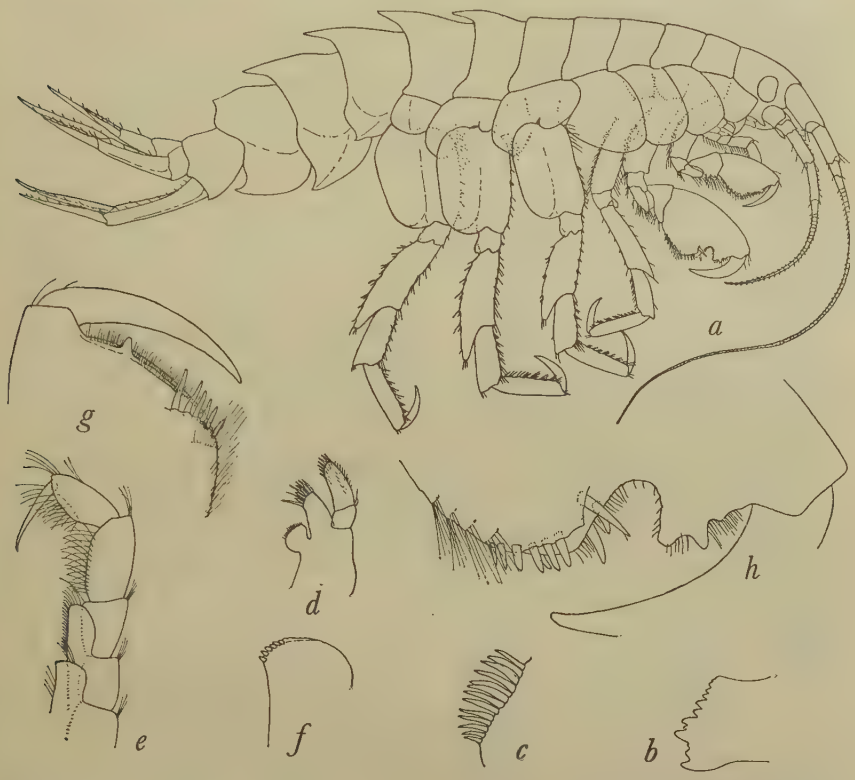

FIGURE 9.—*Sympleustes cornigera*, new species, male: *a*, entire animal; *b*, cutting-edge of right mandible; *c*, spine-row of right mandible; *d*, maxilla 1; *e*, maxilliped; *f*, end of inner plate of maxilliped; *g*, end of gnathopod 1; *h*, end of gnathopod 2.

of 9 setae. Maxilla 2, inner lobe broadly oval; outer lobe narrower, slightly longer, curved slightly inward. Maxilliped rather large; inner plate short, not reaching base of palp, armed on inner distal margin with row of about 6 short spine-teeth (fig. 9*f*); outer plate short and narrow, barely reaching base of second joint of palp, without spine-teeth but bearing slender spinules on inner margin and apex; second joint of palp longest; third joint with apex angular; fourth joint slender, but as long as third.

Gnathopod 1 rather stout; second joint nearly as long as fifth and sixth combined; fifth about ½ length of sixth; sixth joint about ⅔ as wide as long and widest through middle; palm oblique, convex, smooth, bearing small tooth near hinge, without defining angle, but defined by row of 6 long spines on outside, and on inside by 4 rows of spines, below which are several groups of more slender spines (fig. 9*g*); seventh joint rather slender, fitting palm. Gnathopod 2 strongly developed, second and third joints combined as long as sixth; third

joint with lower front corner produced downward; fifth joint very short, produced below into narrow lobe; sixth joint large, strong, palm oblique, without defining angle, deeply incised in middle, bearing prominent bicuspid tooth near hinge. Outside of proximal end of palm with row of 6–7 stout spines, one nearest middle of palm largest and separated from rest; opposite these on inner surface of palm are 2 rows of spines, upper row with 2 spines and lower with 3. Rear margin of sixth joint with 8–9 rows of slender spines. Seventh joint strong and, when closed, rests between edge of palm and outside row of spines.

Pereopods 1 and 2 alike, 2 slightly longer. Pereopods 3–5 much alike, 4 slightly the longest; second joint expanded, hind margin smooth; fourth joint rather long, narrow, hind margin produced to about middle of fifth joint.

Coxal plates 1–4 about twice as deep as their respective body segments; first produced forward with lower front corner quadrate. Coxal plates 5 and 6 with small rounding front lobes, deep hind lobes. Sixth and seventh pereon segments and first and second pleon segments produced dorsally into sharp backward-pointing teeth; third pleon segment carinate, produced dorsally to slight angle, but not toothed. Hind margins of pleon segments sinuous, sharply produced below, first least produced.

Uropods 1 and 2 extending back about same distance, which is farther than uropod 3. Telson boat-shaped, broadly oval, slightly longer than wide, hind margin evenly rounding, reaching to about middle of peduncle of uropod 3 and bearing spinule on either lateral margin. Length of male from front of head to end of uropods about 24 mm.

Female.—Appears to be like male, even in gnathopods. Length about that of male.

Types.—Male holotype, USNM 93874, and 27 paratypes, USNM 107863, taken by steamer *Albatross* at station 4781 (52°14′30″ N, 174°13′ E), June 7, 1906, in 482 fathoms.

Remarks.—*Sympleustes quadridens* Bulycheva (1955) also has 4 dorsal teeth but its gnathopods are slender, poorly subchelate, and have elongate fifth joints. It is the only other species with dorsal teeth assigned to the genus "*Sympleustes*" by Barnard and Given (1960).

Parapleustes pugettensis (Dana)

Figure 10

Iphimedia pugettensis Dana, 1853, pp. 932–933, pl. 63, fig. 6.

Parapleustes pugettensis (Dana).—Barnard and Given, 1960, pp. 43–45, fig. 4 (synonomy).

Female.—Head, about as long as first 2 body segments combined; rostrum short, broadly triangular; lateral lobe rather narrowly rounding; eye more or less reniform, broader in some specimens than in others, black or reddish brown in alcohol. Antenna 1 longer than antenna 2; peduncle about as long as head, joints decreasing consecutively in length and thickness; second joint with shallow transparent lobe on inner distal end; flagellum long, slender, composed of 40–46 joints. Antenna 2, second joint with well-developed gland cone; fourth joint slightly shorter than fifth, flagellum composed of 28–30 joints. Mandibles with toothed cutting-edge. Left mandible with broad accessory plate and spine-row of 8 short broad spine-teeth. Right mandible with accessory plate narrower than in left, spine-row of 8–9 spine-teeth. Molar on both mandibles conical with small triturating surface. Mandibular palp short, stout, third joint slightly longer than second. Maxilla 1, inner plate short, bearing 1 distal plumose seta; outer plate with 9 pectinate spine-teeth; second joint of palp armed distally with 7 spine-teeth, below which, on inner margin, are several spines, inner surface with oblique row of 3 long curved subdistal spines, outer surface with row of 5 long curved spines near inner margin. Maxilla 2, inner plate slightly shorter but wider than outer plate; both armed distally with usual spines, inner plate with stout plumose seta on inner margin. Maxilliped, inner lobe reaching to base of outer lobe, armed on truncate distal edge with 4 curved spines and 4 very small spine-teeth; outer lobe not reaching middle of second joint of palp, inner margin without spine-teeth but with submarginal row of spines arranged in pairs; palp rather short, thick, fourth joint as long as third.

Coxal plates 1–4 slightly deeper than their body segments, lower margins evenly rounding, first 3 bearing at hind corners small tooth preceded by notch containing a setule. Coxal plate 1 slightly expanded distally, produced slightly forward. Gnathopods 1 and 2 much alike but 2 larger; second joint slightly expanded distally but not produced; fourth joint in gnathopod 2, but not in gnathopod 1, ending distally in small point; sixth joint with front and hind margins about equally convex; palm very oblique, without defining angle but defined by 2 groups of spines, edged with narrow transparent lamella, row of many short spinules, 3 groups of longer spines, and bearing near distal hinge low tooth more conspicuous in gnathopod 2 than in gnathopod 1. Third joint of gnathopods 1 and 2 with transparent downward-pointing lobe on front margin. Pereopods 1 and 2 much alike, subequal in length; fourth joint produced downward in front; fifth joint shorter than fourth or sixth; sixth slightly longer than fourth; seventh joint stout, curved, about ½ length of

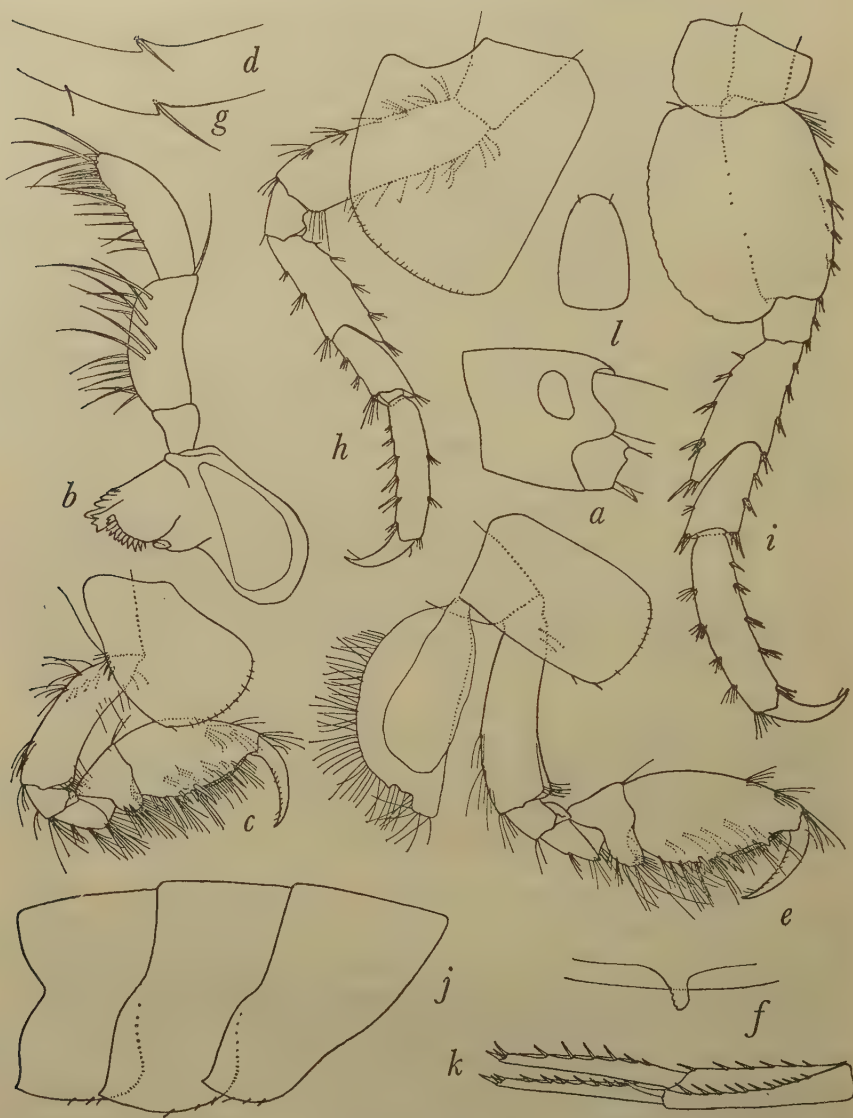

FIGURE 10.—*Parapleustes pugettensis* (Dana), female: *a*, head; *b*, right mandible; *c*, gnathopod 1; *d*, lower margin of coxal plate 1; *e*, gnathopod 2; *f*, tooth on palm, gnathopod 2; *g*, lower margin of coxal plate 2; *h*, pereopod 2; *i*, pereopod 5; *j*, pleon segments 1–3; *k*, uropod 1; *l*, telson.

sixth. Pereopod 3 about equal in length to 2, but slightly shorter than pereopods 4 or 5, which are about equal in length; second joint of pereopods 3–5 much expanded with hind margin smooth or very slightly crenulate; fourth joint produced behind to about middle

of fifth; sixth joint longer than fourth; seventh joint nearly ½ length of sixth.

Pleon segments 1–3 very slightly produced at lower hind corner. Uropods 1 and 2 extending back about same distance, slightly farther than uropod 3. Uropod 1, peduncle slightly longer than rami, spinose on outer and inner margins and bearing rather long stout spine at outer distal corner; rami with rows of spines on upper edges. Uropod 2 shorter than 1, with similar armature but with fewer spines. Uropod 3, peduncle about ½ length of inner ramus; outer ramus about ⅔ length of inner, both rami and peduncle armed on upper edges with few spines. Telson keeled below, narrowly oval, bearing 2 minute setae distally, extending back slightly beyond peduncle of uropod 3. None of body segments dentate. Reaches length of about 9 mm.

Remarks.—*Parapleustes pugettensis* appears to be subject to considerable variation. It has a wide distribution in the North Pacific. Specimens in the U.S. National Museum come from La Jolla northward along the coast of California to Dillon Beach; Cape Arago, Oregon; Vancouver Island; Queen Charlotte Islands; the Alaskan Peninsula and the west coast of Alaska (62°54′ N, 166°38′ W). Barnard and Given (1960) provide information on depth and type of bottom preferred by this species in southern California waters.

Small specimens of 4 or 5 mm. are much less spinose or setose than larger specimens, such as the 9 mm. female from Dillon Beach here figured. *Paramphithoe bairdi*, described by Boeck in 1872 from the coast of California, is in all probability a synonym of Dana's *Iphimedia pugettensis*. Boeck does not give the size of his species, but the description and figures contain nothing that can distinguish it from Dana's species. Gurjanova's species (1938), *Neopleustes derzhavini*, measuring 4 mm., from the Sea of Japan, appears to agree fairly well, so far as her figures show, with Dana's species. A small tooth and seta are shown on her figure (pl. 31, fig. 3) of the first coxal plate, but not on the second; the hind margin of the third pleon segment (pl. 31, fig. 4) is as here shown for *Parapleustes pugettensis* (fig. 10*j*). The teeth on the first 3 coxal plates of many specimens from the west coast of America are so small and inconspicuous that they can be easily overlooked.

Barnard's fine figures (1952) are of a male, while those given here are of a female, showing some of the appendages not illustrated by him. The gnathopods of the 9-mm. female are very much more hirsute than those of the 5-mm. male figured by him.

Family Stilipedidae

Stilipes distincta Holmes

FIGURE 11

Stilipes distincta Holmes, 1908, p. 536, figs. 41–44.—Gurjanova, 1952, p. 194, fig. 17.

Stilipes distincta was described by Holmes from San Nicolas Island off southern California, and he created the family Stilipedidae to receive it. Gurjanova (1952) recorded and figured this species from the western Bering Sea. The genus *Cacao*, erected by K. H. Barnard (1932, p. 153) for *C. lacteus* from the South Atlantic, has the same characters as *Stilipes* and is here considered a synonym of Holmes' genus. *Cacao sanguineus* Hurley (1954, p. 803), from the southeast coast of New Zealand, now becomes *Stilipes sanguineus* (Hurley). Barnard placed *Cacao* in the family Tironidae with some reservation, but it does not agree with that family in several of its characters.

The genus *Stilipes* is very widely distributed, but up to the present time it is represented by only 3 species, *S. distincta*, *S. lactea*, and *S. sanguinea*.

A sexually mature male and an ovigerous female were taken by the Albatross at station 4751 at the southern end of Alaska (55°56′50″ N, 132°04′20″ W) in 288 fathoms, Aug. 30, 1905. The description and figures given herein are of this male.

MALE.—Head and pereon broad, smooth, evenly arched. Head prominent, tumid, as long as first 3 pereon segments combined, bearing peculiar downward-projecting rostrum (fig. 11*b*). Oval bulging area on lower front margin of head represents eye, but no visual elements can be discerned, animal having been in alcohol so long. Antenna 1 about ½ length of body and about ⅔ length of antenna 2; peduncle short, first joint longer than second and third combined; flagellum composed of many joints, first of which is scarcely any longer than rest; second and third peduncular joints and first 7–10 flagellar joints with brushes of forward-curving setae or spines on lower surfaces. Antenna 2 with prominent gland-cone; third joint short; fourth joint shorter than fifth; fifth joint narrower than fourth; both fourth and fifth joints bearing groups of short setae on upper margin and longer setae on lower margin; flagellum composed of many short joints.

Mandible short, stout, without molar or spine-row; cutting-edge chitinous, very broad, without teeth; right mandible without accessory plate, but left with broad plate edged distally with low teeth; palp with second joint twice as long as third. Maxilla 1, inner plate conical, bearing group of terminal setae; outer plate broad, armed with row of 16–17 stout, compoundly curved spine teeth, and brush of setae on inner rounding corner (figs. 11*d*,*e*); palp with very broadly expanded

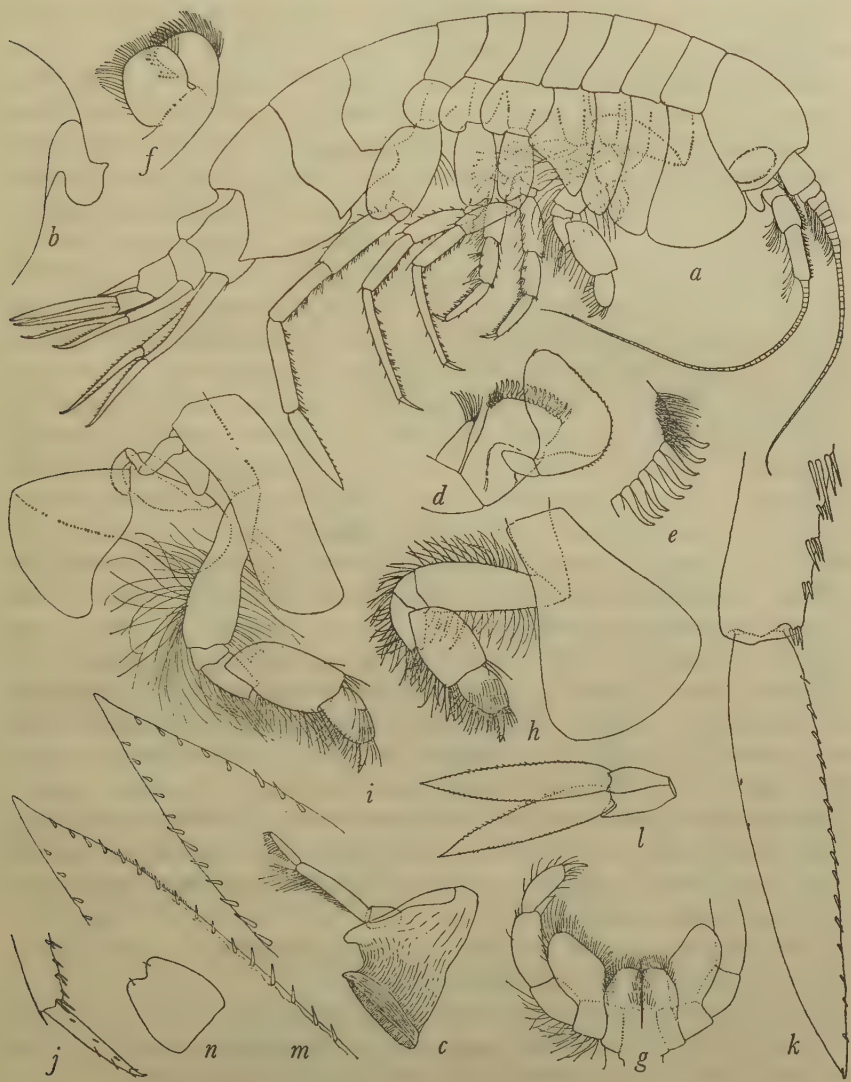

FIGURE 11.—*Stilipes distincta* Holmes, male: *a*, entire animal; *b*, rostrum; *c*, right mandible; *d*, maxilla 1; *e*, teeth of outer plate of maxilla 1; *f*, maxilla 2; *g*, maxilliped; *h*, gnathopod 1; *i*, gnathopod 2; *j*, end of pereopod 4; *k*, end of pereopod 5; *l*, uropod 3; *m*, end of rami of uropod 3; *n*, telson.

second joint bearing low serrations on distal margin. Maxilla 2, inner and outer plates short, broad, inner broader (fig. 11*f*). Maxillipeds rather short, stout; inner lobes short, broad, bearing slender spines but no teeth; outer lobes reaching to middle of second joint of palp and bearing setae but no teeth; palp with second joint longest. Lower

lip with outer lobes slightly curved, converging distally; no inner lobes; lateral processes long, narrow.

Gnathopods 1 and 2 simple, much alike; 1 shorter. Gnathopod 1, second joint about as long as fourth to sixth combined; fifth joint slightly longer than wide, nearly twice as long as narrower sixth joint; sixth joint slightly longer than wide, without palm; seventh joint short, weak; second to sixth joints bearing many long slender spines. Gnathopod 2 like 1 except joints are all proportionately longer.

Pereopods 1 and 2 alike, shorter than pereopod 3; fourth joint very slightly expanded; seventh joint small, nearly straight. Pereopods 3–5 increasing consecutively in length; 3 and 4 much alike, second joint not much expanded, twice as long as wide, with lower hind margin slightly lobed; fourth joint slightly expanded; sixth joint nearly twice as long as fifth; seventh joint rather short, nearly straight. Pereopod 5 stouter, longer than 4; second joint nearly twice as long as wide, with rather deep lower hind lobe; fourth joint slightly expanded, scarcely produced behind; fifth joint slightly shorter than fourth; sixth joint slightly longer than fourth; seventh joint greatly developed, as long and wide as sixth and entirely different from that of any other pereopods, being paddle-like, very thin, converging to very sharp apex, and bearing row of short spinules on front margin (fig. 11*k*).

Coxal plates 1–4 deeper than their body segments and decreasing consecutively in depth. Coxal plate 1 greatly expanded distally with front margin reaching front margin of head. Coxal plates 2 and 3 about as wide as their body segments and with sides parallel. Coxal plate 4 nearly as wide as second and third combined, with lower margin curving obliquely upward and upper hind margin excavated to fit front margin of coxal plate 5. Coxal plates 5–7 not quite as deep as their body segments (fig. 11*a*).

Branchiae present on gnathopod 2 and pereopods 1–5, all more or less irregularly folded, crumpled, or lobed.

Pleon segment 1, lower hind corner not produced. Pleon segment 2 sharply produced; segment 3 more sharply produced than 2. Urosome segment 1 with dorsal hump and slight lateral ridges.

All uropods reaching back about same distance. Uropod 1, peduncle slightly longer than inner ramus, which is slightly longer than outer ramus. Uropod 2, peduncle slightly shorter than outer ramus, which is shorter than inner ramus. Peduncle and rami of uropods 1 and 2 edged with many short spines. Uropod 3, peduncle about ⅓ as long as subequal rami, which are lanceolate, thin, flat, edged with short spines (figs. 11*l*,*m*). Telson reaching slightly beyond peduncle of uropod 3, slightly longer than wide, with sides converging to slightly excavated end (fig. 11*n*). Length of male from front of head to end of uropods about 15 mm.

FEMALE.—Ovigerous female like male, except that upper surface of fourth and fifth peduncular joints of antenna 2 do not bear groups of short setae, but there are short setae which do not form groups. Female large, measuring 21 mm.

REMARKS.—*Stilipes distincta* superficially very much resembles a hyperiid amphipod, such as *Hyperia*. The 3 species, *S. lactea* (Barnard), *S. sanguinea* (Hurley), and *S. distincta* Holmes, resemble one another superficially but differ slightly in some details. *S. lactea* differs from both *S. sanguinea* and *S. distincta* in having the fifth joint of gnathopod 1 longer than that of gnathopod 2. The fifth joint of both gnathopods in *S. distincta* is somewhat longer than in either of the other 2 species. The outline of the first coxal plate is different in the 3 species. Barnard says that the postero-inferior angle of the second pleon segment is quadrate, not acute. In *S. distincta* this angle is sharply produced. Barnard says merely that the rostrum of *S. lactea* is minute, and Hurley does not mention the rostrum in *S. sanguinea*. The rostrum in *S. distincta* seems to be quite unusual in shape (fig. 8*b*) and may be of diagnostic importance. The spine-teeth of the outer plate of maxilla 1 are figured as being evenly curved in *S. lactea* and *S. sanguinea*, but in *S. distincta* these teeth are somewhat compoundly curved. The eye in *S. lactea* and *S. distincta* appears to be more or less oval, but in *S. sanguinea* it is figured as circular. The telson is somewhat differently shaped in the 3 species. In the specimens of *S. distincta* in the U.S. National Museum the original color has entirely disappeared, the specimens having been in alcohol since 1905. *S. lactea* is said to be brown and white, and in *S. sanguinea* the eye is pink and the other regions of the body orange or deep blood-red. The discovery of additional specimens of this genus will help to clear up their relationships.

Family Paramphithoidae

Uschakoviella echinophora Gurjanova

FIGURE 12

Uschakoviella echinophora Gurjanova, 1955, p. 200, figs. 14–15.

FEMALE.—Head, upper part rounding, with small blunt forward-pointing rostrum, below which is slight upward-pointing conical protuberance; lateral lobes very shallow; lower front corner slightly produced; row of spines running from top of head down through eye, and few spines below eye. Eye of medium size, bulging, colorless, which may be because of long preservation in alcohol (since 1890). Antenna 1 about ⅓ length of body; first joint slightly longer than second, which is about twice as long as third; flagellum slender, composed of about 35 joints; first peduncular joint bearing several long

forward-curving spines and several low ridges; second joint bearing 2 or 3 forward-pointing spines, one of which projects considerably beyond third joint. Antenna 2 slightly longer than 1, fourth and fifth joints about equal in length; flagellum composed of about 40 joints; peduncle without spines such as present on antenna 1.

Upper lip broad, symmetrical, not incised. Mouth parts projecting considerably downward, suggesting parasitic mode of life. Mandible with forward part prolonged; cutting-edge rather narrow with blunt teeth; accessory plate not close to cutting-edge; spine-row consisting of close cluster of 4–5 short stout spines; molar strong, prominent, situated at about middle of mandible, triturating surface narrow; palp situated opposite molar, third joint shorter than second. Maxilla 1, inner plate with 2 apical setae clothed in minute setules, giving them velvety appearance; outer plate with 11 simple spine-teeth; palp slender, with 3 apical velvety spines. Maxilla 2, inner plate shorter, broader than outer, both armed distally with velvety spines. Maxilliped, inner plate broad, reaching to middle of outer plate, armed distally and on inner margin with velvety spines; outer plate very broad, reaching nearly to end of second joint of palp, armed distally and on outer margin with short spines, and on inner margin with short spines which appear to be imbedded in flesh; palp rather short, slender, second joint longest, fourth joint short, stout, bearing minute spinules. Lower lip without inner lobes; mandibular processes broad, strong.

Gnathopods much alike, subequal in size, rather short, slender; second joint nearly as long as third to sixth joints combined; fifth joint longer than sixth; sixth joint slightly expanded distally, with lower distal corner slightly produced, thus forming slight chela with stout seventh joint.

Pereopods 1 and 2 alike in size and form, fifth and sixth joints slightly expanding distally; seventh joint stout, strongly curved, very sharp. Pereopods 3–5 increasing slightly in length consecutively; second joint not much expanded, but that of fifth pereopod broadest; fourth and fifth joints expanded distally with lower hind corner considerably and sharply produced; sixth joint slightly expanded distally; seventh joint stout, very sharp.

Pleon segments rounding below, not produced backward. Uropod 1 reaching back slightly farther than 2 and uropod 3 slightly farther than 1; outer rami of all uropods slightly shorter than inner. Uropod 3, rami somewhat expanded, with narrow pointed apices and many very small marginal spinules. Telson reaching considerably beyond peduncle of uropod 3, about as wide as long, slightly expanding distally, bearing shallow triangular excavation which separates 2 rounding lobes bearing few minute spinules. All gills simple, without plaits or

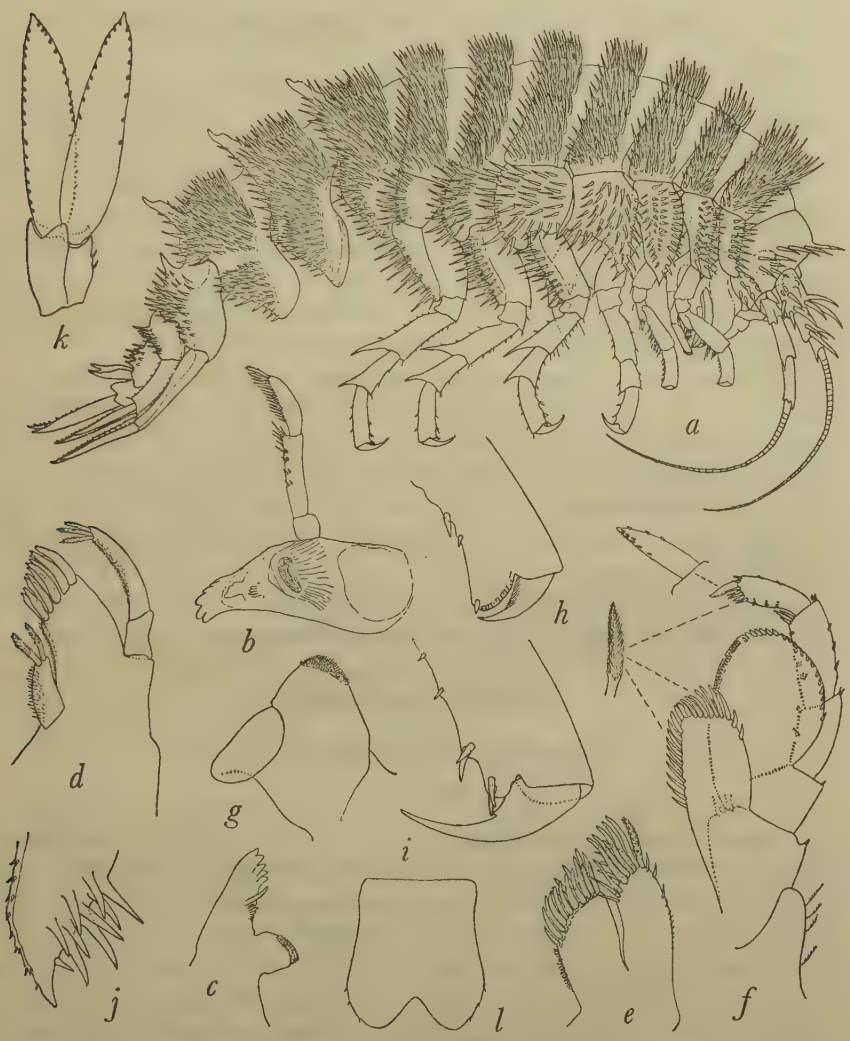

FIGURE 12.—*Uschakoviella echinophora* Gurjanova, female: *a*, entire animal; *b*, right mandible, inside view; *c*, mandible, showing side view of molar; *d*, maxilla 1; *e*, maxilla 2; *f*, maxilliped; *g*, left half of lower lip; *h*, end of gnathopod 2; *i*, end of pereopod 1; *j*, lower end of coxal plate 3; *k*, uropod 3; *l*, telson.

appendages. All body segments and coxal plates densely clothed with long, slender spines. Second joints of pereopods 3–5 bear long spines on posterior margins.

Pleon segments 1–3 each bearing prominent backward-inclined dorsal spine or tooth in addition to regular spines. Urosome segment 1 bearing sharp dorsal tooth directed slightly forward. Largest

female in collection measures 30 mm. from front of head to end of uropods.

MALE.—All males in collection small, only about ¼ length of largest females. Males, however, fully developed sexually. Whether males are normally much smaller than females cannot be determined from the present material. All of the males and the smaller females are much less spinose than the large females.

The specimens that Gurjanova studied were taken east of Sturup Island, the northernmost of the Kuril Islands. The specimens taken by the steamer *Albatross* were from the Bering Sea and the vicinity of Otter Island, the westernmost of the Aleutian Islands.

The specimens taken by the *Albatross* were from the following stations: 3231 (53°33′30″ N, 167°15′40″ W), June 18, 1890, in 54 fms., 2 specimens; station 3599 (52°05′00′ N, 177°40′00′ E), June 9, 1894, 1 specimen; station 4782 (52°55′ N, 173°27′ E), June 9, 1906, in 65 fms., 3 specimens; station 4784 (52°55′40″ N, 173°26′00″ E), June 11, 1906, in 135 fms., 2 specimens. One vial without locality, 21 small specimens.

REMARKS.—*Echiniphimedia hodgsoni* (Walker, 1907) also has the body clothed with spines, but the resemblance is only superficial.

Family Gammaridae

Anisogammarus schmitti, new species

FIGURE 13

MALE.—Head about as long as first 2 body segments combined; side lobe with front margin more or less straight, upper and lower corners rounding, shallow notch near upper corner. Eye not very large, reniform, rather narrow and brownish-black in alcohol. Antennae 1 and 2 about equal in length. Antenna 1, peduncular joints decreasing in length consecutively; flagellum perhaps slightly longer than peduncle, composed of about 20 joints; accessory flagellum of 5 joints. Antenna 2, fourth and fifth joints about equal in length; flagellum nearly as long as fourth and fifth joints combined, composed of about 14 joints.

Right mandible, cutting edge toothed and rather narrow; accessory plate sharply toothed; spine-row of 4 or 5 simple spines and several plumose setae. Molar strong, with plumose seta at rear margin. Maxilla 1, inner plate broad, with closely set row of marginal plumose setae; outer plate with 11 pectinate spine-teeth; palp broad, with 7 apical teeth and diagonal row of 5 distal submarginal setae on outside. Maxilla 2, lobes rather broad, bearing usual distal curved spines; inner plate slightly the shorter, bearing diagonal row of 9 plumose spines, first 2 of which longer than rest. Maxilliped rather long,

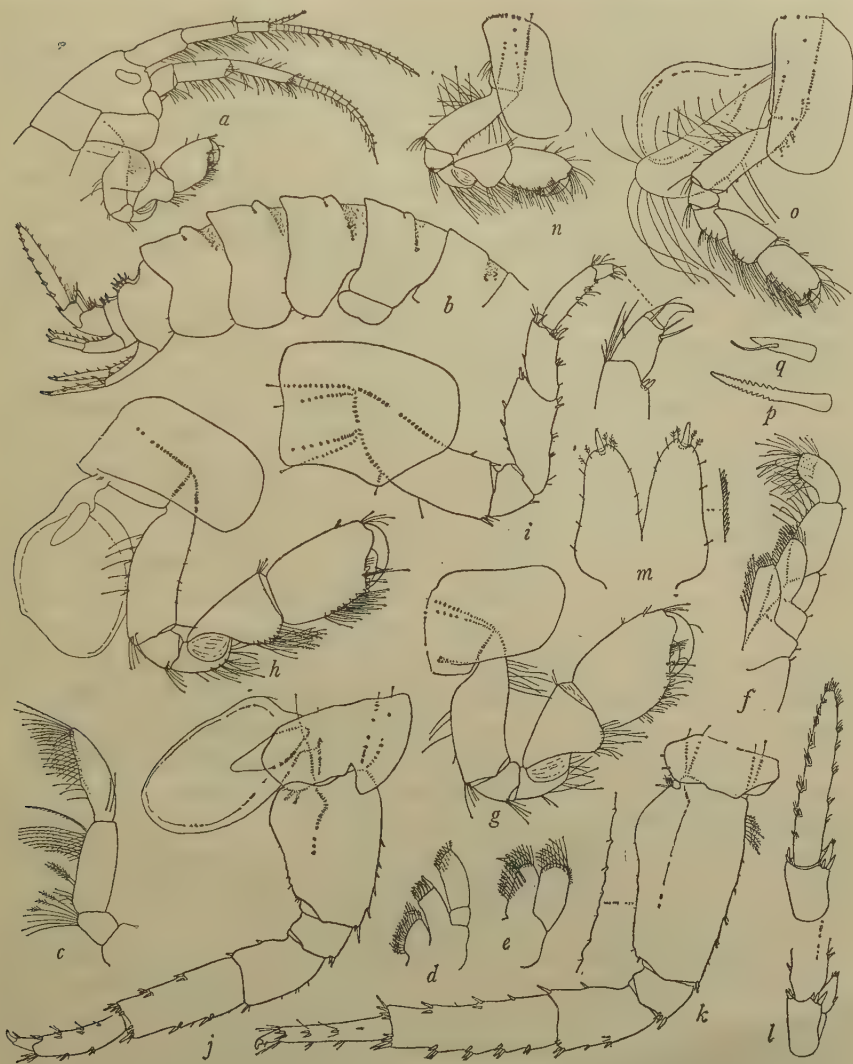

FIGURE 13.—*Anisogammarus schmitti*, new species, male: *a*, front end of animal; *b*, rear end of animal; *c*, mandibular palp; *d*, maxilla 1; *e*, maxilla 2; *f*, right maxilliped; *g*, gnathopod 1; *h*, gnathopod 2; *i*, pereopod 2; *j*, pereopod 3; *k*, pereopod 5; *l*, uropod 3; *m*, telson; female: *n*, gnathopod 1; *o*, gnathopod 2; *p*, spine on outside of palm of gnathopod 2; *q*, spine on inside of palm of gnathopod 2.

slender; inner plate reaching to about middle of outer plate, distal end with curved plumose setae, inner margin with plumose setae, 3 teeth probably present but, because of dense armature of spines, difficult to determine number; outer plate reaching nearly to middle of second palp joint, armed distally with curved plumose spines and on inner

margin with stout pectinate spine-teeth; second joint of palp longest, bearing many long curved spines on inner margin; third joint of palp expanding distally, provided with many long curved spines, some of which are pectinate (fig. 13); fourth joint of palp nearly as long as third, bearing long slender nail.

Gnathopods differing little in length, but gnathopod 2 slightly the longer. Gnathopod 1 slightly stouter than 2; second joint slightly longer than sixth joint; fifth joint slightly shorter than sixth and almost as wide; sixth joint ⅔ as wide as long, palm quite oblique, curving gradually into hind margin of joint, armed on outer margin with row of 7–8 blunt, peglike teeth which extend slight way down hind margin of joint and on inside of palm with at least twice as many blunt teeth; seventh joint strong, much curved, bearing nail which occupies about ⅓ of joint. Gnathopod 2, second joint longer than sixth; fifth joint nearly as long and as wide as sixth; sixth about ⅔ as wide as long, palm not as oblique as in gnathopod 1, passing into hind margin of joint by short curve, armed on outside margin with 7 blunt teeth which extend slight way down hind margin of joint; seventh joint not as strongly arched as that of gnathopod 1, nail occupying about ⅓ of its length.

Pereopod 1 slightly stouter and considerably longer than pereopod 2. Pereopod 2 rather stout (fig. 10*i*); seventh joint short, strong, with upward-curving nail. Pereopod 3 much like pereopod 4 but shorter, its coxal plate larger (fig. 13*j*). Pereopod 5 longest (fig. 13*k*).

Seventh pereon segment and pleon segments as shown in figure 13*b*, obtusely angular posterodorsally, each having slight hump anteriorly with lower hind corner broadly rounding. First urosome segment has dorsally on either side a slightly raised ridge armed with spines. Second and third urosome segments have dorsally on either side a very slight ridge armed with spines. Pleopods rather long; rami about twice as long as their peduncles and equal in length. Uropods 1 and 2 extending back about same distance; uropod 3 extending back much farther. Their armature of spines shown by figure 13*b*. Uropod 3, outer 1-jointed ramus about 3½ times longer than peduncle; inner ramus only about ⅙ as long as outer ramus (fig. 13*l*).

Telson reaching to end of peduncle of uropod 3, about as long as broad, cleft about ⅔ its length, lobes dehiscent, each armed apically with spine and several plumose setae (fig. 13*m*). Gnathopod 2 and pereopods 1–5 carrying branchiae, which are broadly oval and have small sausage-shaped appendage. Length of male about 16 mm.

Female.—Very much like male but smaller. Gnathopods smaller, weaker. Gnathopod 1, palm very oblique, without defining angle but with 4 straight sharp spines on outside, where it curves into hind margin of joint, and 4 on inside of palm; seventh joint not as strongly arched, nail long, slender, bearing forward-pointing tooth at its base

(fig. 13*n*). Gnathopod 2 (fig. 13*o*) longer than 1; fifth joint as long and as broad as sixth; sixth joint about ⅓ longer than wide, palm transverse, convex, armed throughout with very fine closely set teeth, without defining angle, but armed where it curves into hind margin of joint with 5 slender crenulate spines (fig. 13*p*) on outside, and 6 stout straight spines (fig. 13*q*) on inside; seventh joint fitting palm, nail long, slender, bearing forward-pointing tooth at its base.

Gnathopod 2 and pereopods 1–3 carry marsupial plates which are fringed throughout with long closely set simple setae, only few of which are shown in figure 13*o* in order not to obscure spines on joints of limb. Length of female about 12.5 mm.

Types.—Male holotype, USNM 101742, and 15 paratypes, taken by Dr. Waldo L. Schmitt, station 79, on shore of Squaw Harbor, Baralof Bay, Unga Island, Shumagin group, Alaska, Oct. 20, 1940.

Specimens also taken by Dr. Schmitt offshore, on and under rocks, Sand Point, Popof Island, Alaska, Oct. 25, 1940; and Canoe Bay, Alaska Peninsula, south end near opening of Pavlof Bay, Sept. 17, 1940.

Anisogammarus confervicolus (Stimpson)

Figures 14, 15

Mara confervicola Stimpson, 1856, p. 90.
Gammarus confervicolus.—Stimpson, 1857, pp. 520–521.—Bate, 1862, p. 218, pl. 38, fig. 9.—Holmes, 1904, p. 239.
Melita confervicola.—Stebbing, 1906, p. 428.
Anisogammarus (*Eogammarus*) *confervicolus.*—J. L. Barnard, 1954, pp. 9–12, pls. 9–10.—Bousfield, 1958, p. 86, fig. 10.

Male.—Head, lateral lobe obliquely truncate with front margin slightly concave; eye reniform, black, of medium size. Antennae about ⅓ length of body. Antenna 1 slightly longer than antenna 2; first joint slightly longer than second and bearing 1–2 rather stout spines on lower margin; third joint about ½ length of second; flagellum much longer than peduncle and composed of 26–30 joints; accessory flagellum composed of 5–6 joints and minute terminal joint. Antenna 2, second joint with well-developed gland cone; fourth and fifth joints equal in length; flagellum about equal in length to fifth peduncular joint and composed of 11–15 joints, first 7–8 of which bear calceoli on upper distal corners.

Mandible, molar prominent with triturating surface bearing plumose seta; cutting-edge toothed, accessory plate present; spine-row of about 6–7 spines and several plumose setae; palp well developed with third joint slightly shorter than second. Maxilla 1, inner plate large with many plumose setae on lateral margin and few on distal end; outer plate bearing 11 spine-teeth; palp large, second joint armed on oblique distal margin with 6 spine-teeth and several submarginal

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FIGURE 14.—*Anisogammarus confervicolus* (Stimpson), male: *a*, front part of animal; *b*, hind part of animal; *c*, right mandible; *d*, maxilla 1; *e*, maxilla 2; *f*, maxilliped; *g*, outer lobe of maxilliped; *h*, lower lip; *i*, gnathopod 1; *j*, gnathopod 2; *k*, uropod 3; *l*, telson.

setae, and with row of plumose setae on outer lateral margin. Maxilla 2, outer and inner lobes armed distally with many spines; inner lobe armed with spines on inner margin also, and having oblique row of about 11 plumose setae on inner surface. Maxilliped, inner lobe

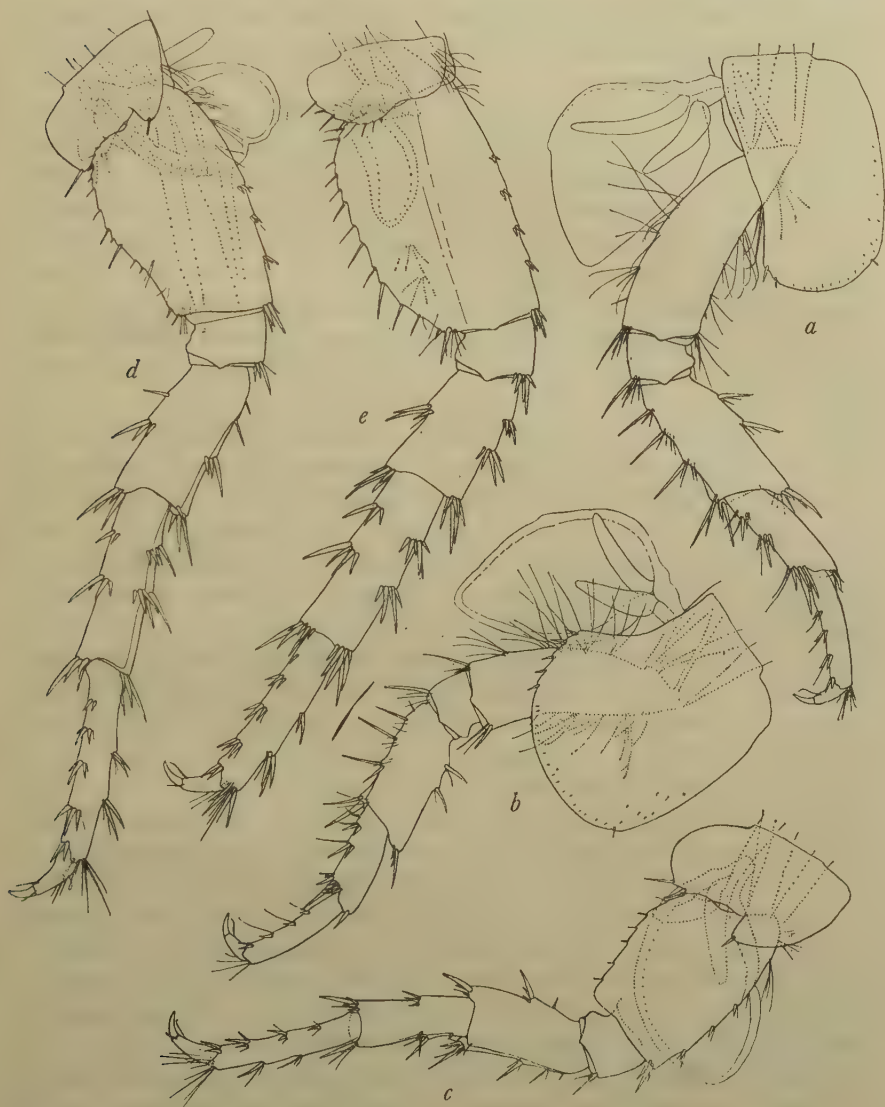

FIGURE 15.—*Anisogammarus confervicolus* (Stimpson), male: *a*, pereopod 1; *b*, pereopod 2; *c*, pereopod 3; *d*, pereopod 4; *e*, pereopod 5.

reaching to about middle of outer lobe, armed distally with 3 spine-teeth and several plumose setae, and on inner margin with usual plumose setae; outer lobe reaching slightly beyond middle of second joint of palp, armed distally with curved plumose spines and on inner margin with spine-teeth and submarginal spinules; palp rather stout but not very long, second joint about as long as third and fourth

combined, fourth bearing sharp nail and several distal setae. Lower lip with small inner lobes; outer lobes broad, rounding; mandibular processes short.

Gnathopods 1 and 2 of nearly equal length, 2 slightly longer; second joint longer than sixth; fifth joint slightly over ½ length of sixth; sixth joint longer than wide, upper and lower margins slightly convex, lower margin bearing several groups of spines, palm slightly oblique, armed on inner and outer margins with row of blunt spine-teeth, without defining angle but passing into hind margin of joint by evenly rounding curve, which also bears row of blunt teeth on inner and outer margins; seventh joint stout, curved, bearing slight protuberance on inner margin near hinge, with only apex closing against palm.

Pereopods 1 and 2 alike, 1 slightly the longer; fourth joint very slightly expanded, with front margin produced slightly downward; seventh joint strong, curved, about ½ length of sixth joint, bearing nail, and prominent seta on inner margin. Pereopods 3–5 with second joint expanded. Pereopod 3 shorter than 4 or 5, which are subequal in length. Pereopod 3 with lower hind corner of second joint quadrate, but bluntly rounding. Pereopod 4, second joint with hind margin convex above and concave below, with scarcely any lower hind corner. Pereopod 5 with hind margin of second joint evenly convex and without any lower corner. Seventh joint of pereopods 3–5 like those of 1 and 2, but larger, stronger.

Coxal plates 1–4 not much deeper than their body segments. Coxal plate 1 slightly expanded below and slightly produced forward; lower margin rather flatly convex, provided with few spinules. Coxal plates 2 and 3 deeper than long, with lower margin convex, bearing few spinules. Coxal plate 4 slightly deeper than long, lower margin convex, hind margin below excavation bearing row of short spines. Coxal plate 5 with shallow front lobe bearing small spine, hind lobe also bearing 1–2 spines. Coxal plate 6 much like 5 but not as deep. Coxal plate 7, hind lobe bearing row of spines.

Pleon segment 1, lower lateral margin convex, lower hind corner represented by small produced angle, bearing setule, front margin with several groups of setae and several small spinules. Pleon segment 2 with lower lateral margin nearly straight, lower corner sharply produced, bearing spinule; lower margin with several groups of setae and several spinules. Pleon segment 3 much like 2 but lower hind corner possibly slightly more sharply produced. Urosome segment 1 bearing dorsally 4 groups of spines, 2 outer having 3 spines each, 2 inner 4 spines each. Urosome segment 2 bearing dorsally 2 groups of 3 spines each, between which are 2 central spines. These urosome spines not accompanied by setae. Uropod 1, peduncle longer than

rami and armed on upper outer margin with 5 spines, 2 of which are apical; upper inner margin with 3 spines, 1 of which is apical; outer ramus slightly longer than inner ramus, each armed with spines (fig. 5*b*). Uropod 2, peduncle longer than rami, upper outer margin with 3–4 spines, one of which apical, inner margin with 2 spines, one of which is apical; outer ramus slightly the shorter, each armed with spines (fig. 5*b*). Uropod 3 extending back farther than 1; peduncle about ⅓ as long as outer ramus, which bears groups of spines containing few plumose setae on outer and inner margin, second joint small, narrow; inner ramus about ¼ as long as outer, and bearing few spines on inner margin and group of spines and plumose setae apically. Telson reaching slightly beyond end of peduncle of uropod 3, cleft about ⅔ its length, armed with spine and plumose seta on either lateral margin, 2 spines and few spinules on apex of each lobe. Gills of gnathopod 2 and pereopods 1–3 each with 2 finger-like appendages. Gill of pereopod 4 with 3 finger-like appendages, gill of pereopod 5 with 1 appendage.

Stimpson gave .4 to .5 of an inch (about 13 mm.) as the length of this species, but there are specimens in the U.S. National Museum measuring up to 21 mm. that were taken from a brackish pond in Snohomish County, Washington, a pond which receives an inflow from Puget Sound at exceptionally high tides. Apparently Stimpson's description was taken from rather small specimens.

Female.—Much like male but smaller. Antennae somewhat shorter, flagellum of antenna 2 bears calceoli which are smaller than those of male. Gnathopod 1 stronger but shorter than gnathopod 2 and like that of male. Sixth joint of gnathopod 2 comparatively narrow, with palm slightly oblique or nearly transverse. Uropods shorter than those of male.

Remarks.—*Anisogammarus confervicolus* appears to inhabit bays, estuaries, brackish tidepools, and mouths of streams where the water is brackish. In the U.S. National Museum there are specimens from Santa Catalina Island, San Diego, and various localities northward along the coasts of California, Oregon, and Washington. The species appears to be common in Puget Sound and has been taken at Vancouver Island. There are 3 collections from Alaska: 1 from Saginaw Bay, Kuiu Island, Frederick Sound, Alexander Archipelago; 1 from a stream entering Orzenoi Bay, southwest Alaska (stream probably brackish, at least at high tide); and 1 from Sitka. Barnard (1954) gives several localities in Oregon and 1 in Alaska (Alinchak Bay), and Bousfield (1958) records the species from a number of Canadian Pacific localities.

Literature Cited

BARNARD, J. LAURENS

1952. Some Amphipoda from central California. Wasmann Journ. Biol., vol. 10, no. 1, pp. 9–36.

1954. Marine Amphipoda of Oregon. Oregon State Monogr. Stud. Zool., no. 8, 102 pp., 33 pls.

BARNARD, J. LAURENS, and GIVEN, ROBERT R.

1960. Common pleustid amphipods of southern California with a projected revision of the family. Pacific Naturalist, vol. 1, no. 17, pp. 37–48.

BARNARD, K. H.

1932. Amphipoda. *Discovery* reports, vol. 5, 326 pp., 174 text figs., 1 color pl.

BATE, C. SPENCE

1862. Catalogue of the specimens of amphipodous crustaceans in the collection of the British Museum, 399 pp., 58 pls.

BOECK, AXEL

1872. Bidrag til Californiens Amphipodefauna. Vidensk.-Selsk. Forhandl. 1871, pp. 32–51.

BOUSFIELD, E. L.

1958. Fresh water amphipod crustaceans of glaciated North America. Canadian Field-Naturalist, vol. 72, no. 2, pp. 55–113.

BULYCHEVA, A. I.

1955. New species of gammarideans (Amphipoda, Gammaridea) from the Sea of Japan, II. Trudy Zool. Inst. Akad. Nauk SSSR, vol. 21, pp. 193–207 [in Russian].

DANA, JAMES DWIGHT

1853. United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842 under the command of Charles Wilkes, U.S.N., vol. 14 (Crustacea), pt. 2, pp. 685–1618.

GOËS, A.

1866. Crustacea Amphipoda maris Spitzbergiam alluentis cum speciebus aliis arcticis. Ofv. Vet. Akad. Forhandl., vol. 22, pp. 517–536, pls. 35–41.

GURJANOVA, EUPRAXIE F.

1938. Amphipoda, Gammaroidea of Siaukhu Bay and Sudzukhe Bay (Japan Sea). Rep. Japan Sea Hydrobiol. Exped. in 1934, Zool. Inst. Acad. Sci. USSR, pt. 1, pp. 241–404, 59 figs. [in Russian].

1951. Gammarideans of the seas of the USSR and adjacent waters (Amphipoda–Gammaridea). Akad. Nauk SSSR, Opred. po Faune SSSR, vol. 41, 1029 pp. [in Russian].

1952. New species of gammarideans (Amphipoda, Gammaridea) from far-eastern seas. Trudy Zool. Inst. Akad. Nauk. SSSR, vol. 12, pp. 171–194 [in Russian].

1955. New species of gammarideans (Amphipoda, Gammaridea) from the northern part of the Pacific Ocean. Trudy Zool. Inst. Akad. Nauk. SSSR, vol. 18, pp. 166–218 [in Russian].

HOLMES, SAMUEL J.

1904. Amphipod crustaceans of the expedition. Harriman Alaska Expedition, vol. 10, pp. 233–246.

1908. The Amphipoda collected by the U.S. Bureau of Fisheries steamer *Albatross* off the west coast of North America, in 1903 and 1904, with descriptions of a new family and several new genera and species. Proc. U.S. Nat. Mus., vol. 35, no. 1654, pp. 489–543.

HURLEY, DESMOND E.
1954. Studies on the New Zealand amphipodan fauna, no. 10: A new species of *Cacao*. Trans. Roy. Soc. New Zealand, vol. 82, pt. 3, pp. 803–811.

SARS, G. O.
1895. An account of the Crustacea of Norway, vol. 1 (Amphipoda), 711 pp., 240 pls., 8 suppl. pls.

STEBBING, T. R. R.
1906. Amphipoda, I: Gammaridea. Das Tierreich, Lief. 21, 806+xxxix pp.

STIMPSON, WILLIAM
1857. On the Crustacea and Echinodermata of the Pacific shores of North America. Boston Journ. Nat. Hist., vol. 6, no. 4, pp. 444–532, pls. 18–23.

WALKER, A. O.
1907. Crustacea, III: Amphipoda. National Antarctic (*Discovery*) Expedition 1901–1904. Nat. Hist., vol. 3, pp. 1–39, 13 pls.

U.S. GOVERNMENT PRINTING OFFICE: 1964